

# Evaluating Women's Preferences around Colour, Scent and Size of Drug-Releasing Vaginal Rings

Xinyu Zhao<sup>1</sup>, Cecilia Milford<sup>2</sup>, Jenni Smit<sup>2</sup>, Bongwiwe Zulu<sup>2</sup>, Peter Boyd<sup>1</sup>, R. Karl Malcolm<sup>1</sup>, Mags Beksinska<sup>2\*</sup>

<sup>1</sup> School of Pharmacy, Queen's University Belfast, Belfast BT9 7BL, UK

<sup>2</sup> MRU(MatCH Research Unit), Dept of Obstetrics and Gynaecology, Faculty of Health Sciences, University of the Witwatersrand, Durban, South Africa

E-mail: xzhao11@qub.ac.uk

Corresponding author: E-mail: mbeksinska@mru.ac.za



QUEEN'S  
UNIVERSITY  
BELFAST

MRU

MatCH Research Unit  
Department of Obstetrics and Gynaecology  
Faculty of Health Sciences  
University of the Witwatersrand

## Key points

**1** Women's preferences for vaginal ring colour and scent were more diverse than for ring size. Ring colors and scents were associated with chemicals, raising concerns of potential irritation to vagina. For ring size, flexibility and comfort were considered important.

**2** Greater choice and options in the design of sexual and reproductive health products with a view to facilitating increased uptake, acceptability, and adherence need to be provided.

## Background

To date, seven vaginal ring products for contraception and hormonal therapy have reached the market and other a large number of new experimental vaginal rings are currently in clinical/preclinical development. The outer diameter of marketed vaginal rings ranges from 54 mm to 56 mm, while cross-sectional diameter varies between 4 and 9 mm, although historically a much more extensive range of dimensions have been evaluated. Marketed vaginal rings are either opaque white or transparent. Here, we assess women's preferences around three key design characteristics of vaginal ring products – colour, scent and size – with a view to developing products with increased user acceptability, product adherence and efficacy.

## Objectives

- To design and manufacture drug-free silicone elastomer vaginal rings having different sizes, colours and scents.
- To design and conduct three women's focus group discussions (FGDs) in eThekweni District, KwaZulu-Natal, South Africa, to explore preferences and attitudes to different vaginal product attributes (size, colour and scent), with a specific focus on vaginal rings.

## Methods

- Drug-free silicone elastomer vaginal rings were manufactured via injection molding using medical grade elastomers and colour masterbatches.

Group I – dimensions	Group II – colours	Group III – scents
external diameters x cross-sectional diameters	<ul style="list-style-type: none"> <li>Color 1: White</li> <li>Color 2: Pastel orange</li> <li>Color 3: Light pink</li> <li>Color 4: Pastel green</li> <li>Color 5: Mellow yellow</li> <li>Color 6: Mauve</li> </ul>	<ul style="list-style-type: none"> <li>Scent 1: Lemon</li> <li>Scent 2: Grapefruit</li> <li>Scent 3: Spearmint</li> <li>Scent 4: Camphor</li> <li>Scent 5: Lavender</li> </ul>



**Figure 1.** Photographs of the four different ring designs of Group I (A, B, C, D from left to right).



**Figure 2.** Photographs of the six different ring designs of Group II (white, pastel orange, light pink, pastel green, mellow yellow and mauve from top left to bottom right).

- Focus Group Discussions (FGDs)

Women's preferences and opinions to different vaginal product attributes (size, colour and scent) were collected and assessed through three groups. The study was conducted in eThekweni District, South Africa in March 2021. Vaginal products of varying colours, sizes and scents were distributed to women to visualize, handle and smell. Basic demographic data were collected from participants. Focus group discussions were audio recorded, transcribed and translated. The qualitative data were thematically analyzed based on inductive and deductive coding.

## Results and Discussion

**Table 1.** Demographic characteristics of focus group participants.

Demographics	(N=16)
Age (mean, range)	26.9 (20–34)
Ever pregnant %, N	75.0 (12)
Number of pregnancies (mean, range)	1.8 (0–5)
Source of household income %, N*	
Employment (full/part time/casual)	68.8 (11)
Government grant	93.8 (15)
Financial support from outside household	18.8 (3)
Education (grade) %, N	
Secondary incomplete	12.5 (2)
Completed secondary	68.8 (11)
Tertiary	18.8 (3)
Current relationship %, N	
Regular partner, not living together	75.0 (12)
Regular partner, living together	18.8 (3)
No current relationship	6.3 (1)
Vaginal product experience* %, N	
Vaginal ring	50.0 (8)
Female condom	43.8 (7)
Vaginal applicator	43.8 (7)
Tampon	37.5 (6)
Vaginal tablet	37.5 (6)
Vaginal film	31.3 (6)
Diaphragm	6.3 (1)
Menstrual cup	0.0 (0)

\*multiple choice options

### Colour preference for vaginal rings

There was agreement across FGDs that (i) product colour choice was an individual decision, (ii) some people prefer coloured products while others prefer white / transparent products, and (iii) in some cases offering a choice of various is preferable.

*"I think colours are very attractive. If you are told this product is for women, I think the first thing that attracts you is colour before you even learn how it works. Even if you get inside the shop, you might just feel it, even if you do not plan to buy it. You just look at this thing with a beautiful colour and you start asking about it if you do not know about it, and they explain it to you and then you buy it, but the colour is very attractive."* – Group 2, Participant 2, product inexperienced group

*"Just to add, colour is not important more than safety and comfortability. [...] as long as there is safety and I am comfortable, I think that is enough for me."* – Group 2, Participant 2, product inexperienced group

### Scent preference for vaginal rings

Similarly, (i) some participants liked products with scents, whereas others preferred them to be unscented. (ii) Participants' preferences for the example scents also varied. (iii) Participants in all groups suggested that their concerns around product scent were related to whether the scent could cause vaginal irritation.

*"I would prefer to both, [scented and non-scented], so that a person can take their choice."* – Group 3, Participant 2, mixed experienced group

*"I like lemon and lavender, the lavender for me smells like perfume. I did not feel like it is a cleaning product. [...] I do not like camphor."* – Group 2, product inexperienced group

### Size preference for vaginal rings

Participants from all groups preferred the size of vaginal ring A having the thinnest cross-sectional diameter, but greatest overall diameter, stating it would be easier to insert and more comfortable to wear. Flexibility and width were considered important factors for insertion and comfort with use.

*"You can see that A is not the same size as the rest of the rings, others are a bit bigger than A. So, A was created so that when it is inserted it sits well and you feel comfortable."* – Group 1, Participant 2, product experienced group

### Acknowledgements

We would like to thank the community who gave their valuable time to participate in this research, and without whom the study could not have been done. The work was supported by a grant funded by the Queen's University Belfast and University of the Witwatersrand (Wits) Seed Fund.