Firmness Perception Influences Women’s Preferences for Vaginal Suppositories

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Background

Vaginal Microbicides are a woman-controlled method to reduce or block the transmission of HIV and other STIs. Several microbicidal prototypes are in the clinical trial pipeline but no products have been commercialized to date. Lack of patient compliance has been shown to impair the real world effectiveness, so it is important to understand women’s preferences while designing these products.

We are investigating carrageenan-based microbicidal prototypes in the form of gel ovaules which when inserted vaginally will function as drug delivery vehicles. To understand how women’s preferences and willingness to use are governed by the product’s physical attributes, we have prepared gel ovaules of varying size, shape and firmness in an iterative design process.

Iterative Design process

Focus groups
Samples: 3 sizes, 4 shapes and 5 firmness levels
Preferred size: Long oval
Preferred size: Variable 1-5 mL
Preferred firmness: Variable

Sensory test for size and firmness
Sample shape: Long oval
Preferred firmness: G’=2500 Pa (w/o applicator), 12500 Pa (with applicator)
Preferred size: 3 mL

Sensory test for second generation of shapes
Sample firmness: G’=25000 Pa
Sample size: 3 mL
Preferred shape: Long oval and bullet

Firmness can also be divided into sub-qualities of feeling of hardness (storage modulus G’) and elongation properties (degree to which it can be stretched/compressed before breaking). In the present study, we explored how small and large scale deformation properties may interact to influence preference and willingness to try in sexually active women.

Methods and Results: Physical characterization and drug release

Suppositories soaked in VSF for 24 h

Elastic gels can withstand more strain in tension and compression compared to brittle gels before fracturing.

Drug is released at a significantly slower rate from elastic suppositories as compared to brittle suppositories.

Conclusions

• Previous work has shown that multiple factors influence women’s willingness to try vaginal microbicides. These include sensory attributes, like size, shape and firmness, as well as non-sensory factors like the frequency of application, duration of protection and potential for covert use.
• In this iterative design process, we have further explored the physical parameter of firmness by creating gels with the same small strain measurements but with different large strain attributes.
• Small strain measurements i.e. G’ typically relates to perception of “firmness” and influence the imagined comfort of the suppository during insertion and use. On the other hand large strain attributes which quantify the failure properties, i.e. how much force or deformation is required to break the material are related to the amount of manipulation that the suppository could survive during insertion.
• Women perceive both suppository types very differently (depending on G’) in terms of its sturdiness, ease of handling, imagined ease of insertion which in turn affects their preferences as well as willingness to use.
• A range of instrumental measures need to be combined with sensory data for product development.

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