

EXPERIMENTAL STUDY IN DEVELOPING A BRA FOR MATURED WOMEN IN SRI LANKA

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Abstract. Female body is highly changing during the life time with certain circumstances and situations. Especially aging, pregnancy and menopause lead the female breasts towards such anatomical changes. As the major changes, the breast sagging, sweaty skin and sensitivity of the skin can be identified. With these changes the preferences towards using a bra also changes. Therefore, they have found a concerned number of issues in the available products within the local market. Even though the international market has started to move towards addressing such issues, in Sri Lanka the available product ranges make the adult women highly dissatisfied. Therefore, the techniques that have been used internationally should be applied to the products in the local market and improve them to address the main concerns of the particular customer category with an affordable price level. The main objective of this research was to identify the anatomical changes of female breast that occur due to aging and the preferences that they concern in wearing a bra. Further, a prototype of a bra that addresses the issues of the customer was developed using appropriate techniques and validated. The research will provide an opportunity to identify the market gap available in Sri Lanka, awareness to avoid the current issues and to develop more products according to the customer preferences resulting customer satisfaction.

Keywords: *aging, breast sagging, sweaty and sensitive skin, issues of bra*

Introduction

The social obsession with youthfulness is well documented, however with older women in particular feeling pressured over the increasing age. Within the market an outward appearance, the clothing preference of matured women have been neglected, while in particular, bra preferences have been largely ignored (Risius, 2012). Women's body, especially breasts start changing anatomically with increasing age, during the menopausal transition and breast feeding. These changes alter the size, shape and internal support of the breast causing sagging and uncomfortable pressure against the body while wearing bras (Risius, 2012). With such changes the particular customer category expects different needs and requirements through the products that they use. Specifically, the expectations of using a bra prominently changes parallel to the anatomical changes of the breasts. They lose interest towards the stylish products and move towards the comfortability, support and fit (Risius et al., 2012).

But the lingerie market predominantly revolves around bras designed for younger women that older women may feel are inappropriate for their physique (Risius, 2012). Even though there are few product brands which cater to mature women, they tend to be less suitable and unaffordable for Sri Lankan Women.

Female breasts changes within 30-to-50 years

Both aging and reproduction have been shown to influence female body shape (Wells et al., 2010). Anatomical research identifies that with increasing age the female

breasts alter the size, shape and the internal support of the breast. Breast sagging contributes to breast shape and often occurs with aging, breast feeding or after weight loss. The natural variation of sagging may be related to breast size, skin, and hormonal balance (Groyeka et al., 2017). Female menopause starts at around 50 years of age and with these transition vast changes happen in women's body. Therefore, it needs to be considered as a completely individual topic. Therefore, this study was focused only from 30 to 50 years of age group in order to achieve a better output.

Skin changes

The aging process considerably alters both the structure and the mechanical properties of skin and aged skin is less extensible and less elastic (Gefen and Dilmoney, 2007). Many of the effects of estrogen on human skin are based on the changes that are seen in postmenopausal women although there is a variation in skin thickness (Stevenson and Thornton, 2007). The skin of the breasts is less elastic than fibres and provides the most support to the breast tissues. Aging changes the skin of the breasts into a thinner and less elastic structure. Literature has proved that menopause cause rapid thinning of the breast's skin which will increase the sensitivity and lead to a less extensible structure also an increment of sweating with hydration (Risius, 2012).

Issues in the existing bra products

The commercial bras have been developed for more than 100 years but problems of discomfort, bad fitting and poor support still exist such as, pressure from tight shoulder straps, pain rashes resulted from rigid under wires, irritation by bra cup seams and so on. With the changes of the body due to aging and menopause these issues seem to be increased in serious manner. It was revealed that too tight bra straps can cause headache and lead to serious nerve damage. If a strap digs into the shoulder, it not only causes disfigurement of shoulder tissues but also, puts pressure on the cervical nerve (Chan et al., 2015). Many women want uplifting support provided by an underwire, but also hate its stiffness and pressure against the inner body. Problems associated with under wires are the discomfort caused by the wire poking through the fabric or chaffing against wearer's skin (Chan et al., 2015).

Further, badly fitted bras can lead to health concerns. The variances in the human body over time and the differences happen during different situations directly affect the fit of a bra (Chan et al., 2015). Bras having tight elastic bands and rib plastic bones might affect the body and press directly against the skin and the rib cage thereby causing redness, soreness or even breast cancer. The stressful elastic under band would create rashes due to the poor ventilation and perspiration. The thickness and bulkiness of back fastening hooks would increase chafing to the skin. Besides, the too tight fastener would lead to the back of the bra riding up (Chan et al., 2015).

According to Risius (2012), preferences of matured women regarding the support of the bra, they expect uplift of breast through the bra and prefer support in all activities and consider it as the base of using a bra. Further, they expect that the breasts should not bounce and also overcome breast sagging by wearing the bra.

Problem identification

According to the questionnaire survey done by the researcher, 75% of mature women agree that they are undergoing with issues in using the bra products that are already

available in Sri Lankan market and they do not address their specific requirements and preferences. It shows that majority of mature women in Sri Lanka agree that the bras in the local market should be improved in a way that their specific requirements are addressed in a proper manner. According to 75% of the customers, the fabrics used in the products are very uncomfortable which will irritate the skin and create perspiration issues. Further, the support level of the bras are very much less which will not reduce or avoid breast sagging and they contain fit issues. Nearly 50% of the mature customers agree that usage of padding in bras cause uncomfortable effect to the skin. Further, the preferences towards bra for mature women whose breasts have changed anatomically are not that highlighted in Sri Lanka. Though international brands available, they are not affordable for majority of Sri Lankan mature women.

The main objective of the research is to identify the preferences, needs and requirements of women within 30-to-50 years in Sri Lanka towards using a bra and develop a prototype with special techniques and constructions that cater the above age range and their preferences.

Materials and Methods

By referring journal articles and e books, the anatomical changes of female breasts with increasing age, breast feeding and menopause was explored. Further, information regarding the issues that contain in the prevailing bra products was gathered from a questionnaire survey which was done from a convenience sample of females in the age range of 30-50 years. The information gathered from 80 women through questionnaire survey and interviewed 15 women in the specific age category. Further, the special techniques and features to develop a proper product were analyzed through investigating the existing products in the international markets and brands and most appropriate methods to cater to the problems of breast sagging, sweaty and sensitive skin and affordability of Sri Lankan customer were analyzed and identified in order to develop a new product.

Developing the product idea

By analyzing the information gathered through the feedbacks, product idea was mainly focused on the main issues; breast sagging, sweaty and sensitive skin, pressure caused by the underwire of the bra and affordability. A cut and sewn bra was developed with panels in order to achieve the shape without using molded cups. A foam sling was applied inside the cut and sewn bra cup to provide support and uplift from the sides and the bottom of the breasts in order to avoid breast sagging. Further, an elongated cut and sewn bra cup was used and a cradle was added to the bottom to provide more support. Since removing the underwire reduce the support, a wire casing was used without inserting the wire in order to maintain the bust root. Cup molding which is a costly process, it was avoided and a cut and sewn bra cup was added to build the shape. To address the issue of sweaty and sensitive skin, a stretchable fabric with good absorbance quality and good hand feel was chosen. Further, the expensive materials was replaced with a similar fabric in the local market and simple operations were carried out to stitch the sample in order to reduce manufacturing cost.

Fabrics mainly used for bras in the industry for the international market are warp knit (75% Polymide & 25% Elastane and 67% Polymide & 33% Elastane) and weft knit (79% Polymide 21% Elastane). As a substitute, weft knit fabric with high cotton

percentage, which has good moisture-wicking quality; good hand feel and moderate stretchability could be found from local market in order to give support and the comfortability towards the wearer while maintaining the affordable cost. The bra sample was finished with appropriate seam types and stitch types.

Results and Discussion

Perspective of the customers on the local market

According to the feedback from questionnaire survey, 75% of the customers complained that the fabrics used in the products are very uncomfortable which will irritate the skin and create perspiration issues (*Figure 1*). Also the support level of the bras are very much less which will not reduce or avoid breast sagging and they contain fit issues. Nearly 50% of the customers agree that usage of padding in bras cause uncomfortable effect to the wearer.



Figure 1. Issues of bras faced by mature women in Sri Lanka.

Further, information related to the uncomfortable pressured areas of wearing a bra was gathered using the sketch in *Figure 2*. According to the data, 75% of the matured women are irritated with the under wire pressure while 50% of them mentioned the pressure that is caused by the underarm is very uncomfortable (*Figure 3*).

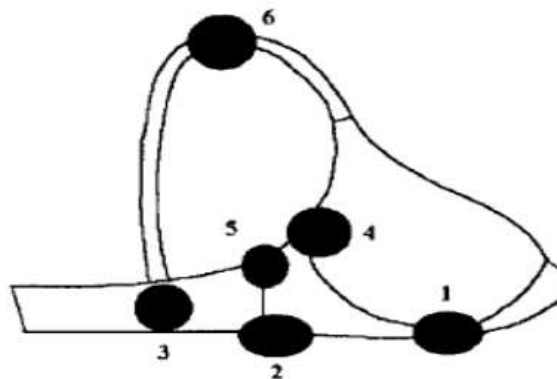


Figure 2. Pressure points of wearing a bra.

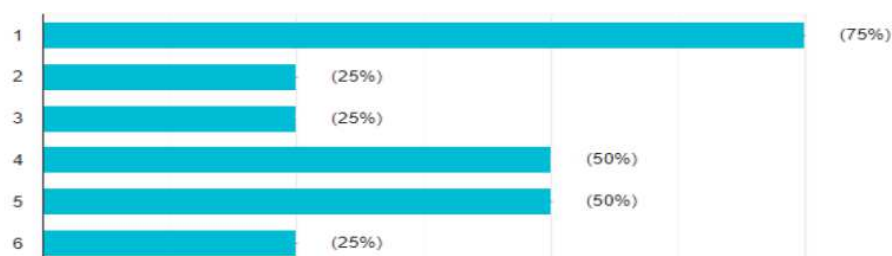


Figure 3. Analysis of pressure points with the customer (in percentage).

The cup panel was constructed by attaching two panels together along the style line which is to achieve the 3D shape of the cup since the molding technique was not used due to the high cost (*Figure 4* and *Figure 5*). Further, the cup apex was elongated up to a higher level in order to provide more support to the wearer and to hold the breasts up using the extra support. The straps were attached directly to the cup apex using bar tacking to avoid using a ring there which can cause an irritation to the wearer with the cup apex position. A sling was added in the particular shape using a thick foam pad to provide the support and the uplift for the breasts from the underarm and the bottom. The application of a sling was chosen to provide an extra support to the sagging breast with a comfortability that gives from an unlined bra. Due to the dissatisfaction of using underwires among the particular customer category, the underwire was removed from the construction. However, since the difficulty to maintain the bust root properly and to hold the breasts in place without an underwire only a wire casing was attached to achieve the bust root. The cradle was applied until the mid of the around cup and planned it as one piece in order to reduce the seams which can cause irritation to the wearer. The reverse side of the cradle was applied with stabilizer in order to strengthen the cradle and to provide more support to the cradle area. The cradle bottom was finished using attach outline with elastic to provide support and stretchability (*Figure 6*).



Figure 4. Flat appearance of the product from outer view.



Figure 5. *Flat appearance of the product from inner view.*



Figure 6. *Cradle construction (inner view).*

The wing was constructed with two fabric ply to provide more support and extended till the mid of the around cup to add more coverage while providing more support and strength (*Figure 7*). Further, the wing shape was taken as a straight wing to add more hold around the body. The inner panel and the outer panel were attached together using attach outline with elastic to provide more stretchability.



Figure 7. *Wing construction (inner view).*

Fit analysis

The sample product was fitted to a selected woman who is 45 years old within the customer category (*Figure 8*, *Figure 9* and *Figure 10*) and interviewed her to get the

feedback on the constructions and the techniques that have been used to develop the product.



Figure 8. *Product fit analysis (front view).*



Figure 9. *Product fit analysis (back view).*



Figure 10. *Product fit analysis (side view).*

According to the respondents' feedback, the elongated cup apex holds up the breasts in a supportive manner while cut & sewn cup construction feels comfortable compared to the padded cup constructions. Further, the foam sling under the bust area provides an uplift and a support to reduce the breast sagging. The cradle provides support at the bottom of the bust while its coverage helps to add more support to hold the breasts up. The wire casing avoids the irritation caused by the metal wires and feels comfortable against the body. Further, the respondent's added that the fabric of the bra absorbs sweat and no irritation to the skin and feels comfortable to the body.

The respondent's opinioned that the widths of the top cup from the neckline are required to be increased in providing more coverage. Furthermore, the strap attachment to the cup apex is a bit bulky which require further improvement. When considering the cost of the bra, the operations and the materials was used by avoiding highly cost techniques such as molding, bonding, etc., to maintain the affordability of the product.

Conclusion

The research was mainly based on the issues of the bras available in the local market that cause dissatisfaction among the 30-to-50 years old women in Sri Lanka. Further, this research helped to identify the anatomical changes that happen in women's breast with aging and menopause. Mainly, breast sagging, sensitive and sweaty skin was concerned in developing the bra sample. In order to provide solutions for the identified issues, the available techniques, construction methods and materials in the international market was explored. Through analyzing the techniques, the feasible and affordable methods were chosen to apply for the product that was developed to address the concerns of the particular customer category. The developed bra sample was fitted to a woman in particular category and received the feedback. The bra sample achieved positive feedback with further improvements. Even though the developed prototype of bra was successful in a way to address the issues concerned, the product can be further developed by improving the patterns and by selecting fabric that are more suitable for bra construction especially considering the absorbent quality, stretchability and hand feel.

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Conflict of interest

The authors confirm there are no conflict of interest involving any parties in this research study.

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