Application of Antimicrobial Non Woven Fabrics in Nursing Pads

Ibrahim, G.E.

Nature and Science, 2011;9(10)

Abstract

Nursing pads

The feeding of a baby is essential for its correct development and for good nutrition and it is strongly advised by pediatricians, midwives and other experts in breastfeeding. A period of time (several days to few weeks) elapses during which the demands of infant gradually influences the hormonal production of the mother which, in turn, adjusts the volume of milk production.

Two types of milk are produced by the human female breast: fore-milk and bind-milk. The majority of milk which nourishes the baby is called hind-milk and is produced during nursing. However, fore-milk is produced between feedings and may constitute a significant leakage problem to the mother.

Because of variations in the human physiology, some women who are breast feeding their children may simply experience overproduction of milk between feedings and the associated leakage. This problem is especially acute during the night ·

In order to prevent staining of clothing and embarrassment caused by leaking of milk, nursing mothers employ pads to absorb leaking fluids and decrease skin irritation for the mother breast and, such pads are commonly placed inside the bra ·

Types of nursing pads

There are two major types of nursing pads .The first is a therapeutic breast pad for heating or cooling the female breast during nursing to alleviate the symptoms of clogged milk duct.The second type (which is concerned in this research) is the brassier pad used by nursing mother for absorbing breast milk leakage after nursing her baby to prevent seepage into and through her garments, principally during the night ·

Brassier pad devices for absorbing breast milk leakage are available on the markets and fall also into two general categories: disposable and re-useable pads

Nursing pads construction

Nursing pad is constructed of a plurality of substantially coextensive layers having different characteristics: a non-permeable layer (backing layer) for preventing transfer of breast milk from the liner to clothing , an absorbent layer (inner layer) which comprises an absorbent material for holding the milk within the liner , and a wicking layer (facing layer) to draw the liquid away from the breast and into the absorbing layer.[9-11].An adhesive may be applied to the outer portion to hold the pad in place in the bra .

Characteristics of nursing pads

The presently available nursing pads suffer from a number of disadvantages. The primary disadvantage is inadequate absorbency, particularly during the night when the breast continue to produce fore-milk when the mother sleeps. Another problem is that of

the undesirable soggy feel to the mother after she has worn the pad for a period of time. Yet another problem is that of the nursing pad sometimes disintegrated while being used. Thus , there is a need for an improved nursing pad which minimize the strike-through problem and which enhance comfort of the nursing mother while in use. Thus the nursing pad must provide increased comfort and absorbency and improved wear ability when not nursing and decrease skin irritation.

This research concerns with producing fabrics suitable for being used as nursing pad. Five kinds of textile materials were used in this research, polyester, viscose, viscose/ polyester blend, cotton and polypropylene. Nonwoven construction, using random- laid technique for forming the web and spun-laced process for web bonding, was used for producing the inner and outer layers for all samples under study. Samples were treated with a chemical formula called triclosan (organic antibacterial) of 15 % concentration as an antimicrobial agent.

Antimicrobial treatment (using triclosan)

In this study, antimicrobial finishes was applied to all samples. Antimicrobial treatment were applied to fabrics to prevent the growth of microorganisms exposed to the fabrics and so provide increased comfort and improved wear ability when not nursing because of the decrease in skin irritation.

Samples were padded in an aqueous solution containing 100 % triclosan and then squeezed to a wet pick up 100 %.Samples were dried at 45 ^{0}C for 15 min ,then thermo-fixed at 120 ^{0}C for 20 sec.

Tests applied to samples under study

Several tests were carried out in order to evaluate the produced fabrics, these tests were ,Antimicrobial, Roughness, Air permeability ,Water absorption ,Fabric thickness.

Antimicrobial test

From tables , that the data revealed untreated fabrics did not provide any resistance against microbes. Treatment of fabrics with triclosan led to an improvement in properties of the anti- microbes and it was found that treatment of fabrics with cellulose-based substance with triclosan provided good microbe resistance.

It can also be seen that the diameter of free activated bacterial zone has increased from 10 to 22 at *Staph* , from 9 to 20 mm at *E.Coli,* from 0 to 13 at *Aspergillus flavus (Fngus),*and from 0 to 12 mm at *Candida albicans (Fungus).*It can also be seen that samples of high weights ,viscose 20 g/m^2 ,cotton 45 g/m^2 and cotton /polyester 32 g/m^2 have achieved the highest diameters of free activated bacteria zone , whereas polypropylene16 g/m^2 has achieved the lowest diameter of free activated bacterial zone.

the results in the present work can state that cellulose samples have absorbed the treatment material more than the synthetic samples, also the increases of weight has increased the absorption of the treatment material leading to the increase in the free activated bacterial zone.

Roughness test

From the tables of roughness results and diagrams it is clear that, there is a direct relationship between weight/m^2 and roughness. It could be stated that samples of high weights contain more fibers compared to samples of low weights and hence the total shear force within the fabric is higher. From the results of roughness test it is clear that there is direct relationship between treated samples and fabric roughness. The results in the present work can state that can state that antimicrobial treatment causes an increase in weight and thickness and hence an increase in samples roughness. This is due to higher fabrics coarseness after antimicrobial treatment because the treatment was made using alkali and high temperature , these factors cause decrease in fabric smoothness .

Air permeability test

In this study the researcher has treated nursing pad samples with triclosan to improve their antimicrobial and water barrier properties.It is obvious from tables that samples with low weights have recorded high rates of air permeability while samples produced with high weights have recorded the lowest rates, because low weights means a decrease in fibers amounts per unit area which permit the air passage. It is also obvious that viscose samples have achieved the highest rates of air permeability, followed by polypropylene, polyester, polyester/ viscose blend and then cotton respectively, but the relationship between them is not clear.

Water absorption test

It is obvious from results that samples of viscose wadding have achieved the highest rates of absorption, whereas cotton samples have achieved the lowest rates. This is due to the molecular structure of viscose fibers have large areas of amorphous regions (represent 2/3 of viscose molecular structure), whereas the molecular structure of cotton fibers has large areas of crystalline regions (represent 2/3 of cotton molecular structure).

From the results it is obvious that samples produced of viscose fiber have achieved the highest rates of water permeability among all produced samples .This is due to that viscose fibers have higher absorbency (14%) compared to polyester fibers (0.4%), and so allow the free passage of water through the fabric.