Identification of Moisture Loss and Weight Drop of Soap Tablets during Shelf Life

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ABSTRACT

Soap which comes under the skin care category is one of the fastest moving segments in the current market. In this highly competitive market, quality has become the key feature to expand and maintain a loyal customer base. Each and every substitute products include different ingredients depending on its trade name and category. There is a specific moisture level and a weight for each soap category at the time of manufacturing. And these levels are expected to remain unchanged during its expected shelf life of 24 months. But when the soaps are distributed to the market, they are stored in different conditions which result in moisture evaporation. As a result of this moisture evaporation, soap tablets lose their weight and result in deviation from the specified levels which create customer dissatisfaction.

Therefore, this research was initiated with the objective of identifying the percentage of moisture level and weight drop during the shelf life of the soap tablets. The research was conducted on randomly selected 24 soap tablets from each of seven different soaps selected from three main soap categories of laundry, bathing and baby soap in order to test the moisture and the weight loss with the time. Descriptive statistical analyses were carried out using SPSS and findings show that weights of the soaps were dropped gradually and at the end of the period only eighty percent of production quality of soaps could be remained and thus suitable packaging strategy should be implemented to ensure promised qualities of the soaps at actual delivery.

KEYWORDS: Moisture Loss, Shelf Life, Soap, Weight Drop

INTRODUCTION

The laboratory monitors the formulation and specification of soap products from raw material to finished goods. Most of the soaps are formulated locally, and the laboratory tests a range of formulations for stability and manufacturing practicality.

The soap manufacturing process itself is closely monitored to ensure any quality losses to be kept at a minimum. Moisture level in the soap is a very important factor which keeps the soap without making it dry. But as time goes, moisture level in the soap gets evaporated automatically due to various environmental conditions.

Since moisture is the water level in the soap, it starts evaporating as it contacts or is stored in a warm condition. And it makes the soap dry and rough which decreases the quality level of the soap. Because of that reason, there is a considerable number of customer complains recorded regularly.

Therefore, it is important to ensure the quality standards by soap manufacturers. If they try to overcome those defects by adding more percentage of the ingredients to the mixture then their profit margin will be reduced and actual quality could be deviated. However, strategic action is important to fulfil customer satisfaction and protect the manufacturer's reputation. Therefore, it is important to identify the problem related to the reduction in soap

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quality and to provide applicable strategies to overcome the issues.

The moisture evaporation from a soap tablet is a natural scenario. This is occurred in any kind of soap tablet irrespective of the brand or types of the soap. Soon after the soaps are manufactured, the evaporation of moisture level will be started thus weight of the soap is also gradually reduced. It is important to understand the rate of weight and moisture of the soap decreased. Therefore, this research was carried out with the objective of identifying the percentage of moisture level and weight drop during the planned shelf life of the soap tablets.

LITERATURE REVIEW

All soaps and detergents contain a surfactant as their active ingredient. This is an ionic species consisting of a long, linear, non-polar 'tail' with a cationic or anionic 'head' and a counter ion, the tail is water insoluble and the head is water soluble - a difference in solubility which has two important implications. Firstly, this makes the surfactant molecule a wetting agent: the tails migrate to align themselves with the solid: water interface, lowering the surface tension at that point so that it penetrates the fabric better. Secondly, it allows the oily dirt particles to form an emulsion with the water: the tails of many surfactant molecules surround an oily dirt particle, forming a micelle with a drop of oil in the centre and the ionic heads of the surfactant molecules pointing outwards and hence keeping the micelle in the polar solution. (Selinger, 1986).

Packaging for High Moisture Bar Soap

The bar soap products comprises:

- A bar soap package comprising a laminate material
- A bar soap composition comprising at least about 15%

The bar soap packaging comprises a laminate material comprising a paperboard material, a thermoplastic material disposed on at least one side of the paperboard material, and a fungicide (Zhang et al., 2007).

Packaging provides various solutions for high moisture bar soap compositions which address number of potential problems associated with this nature of products. It facilitates with the solutions such as,

- Minimizing moisture loss
- Inhibiting mould growth on paperboard material used in the packaging
- Preventing the development of collared stains on the bar soap and packaging

which result from chemical reaction between the high moisture bar soap and the paperboard, especially in recycled paper board.

However, upon storage in conventional paperboard packaging, high moisture bar soaps tend to encounter of number of potential problems. These problems include moisture loss (via evaporation or absorption into the paperboard packaging material), mould growth on the paperboard packaging material etc.

Bar Soap Composition

The bar soap composition of the present invention comprises water, soap and other optional ingredients (Zhang et al., 2007).

Water

It should be understood that an amount of water will be lost, i.e. evaporated, during the process of making the bar composition. Once the finished product is made, water can further be lost from the bar composition due to water evaporation, water being absorbed by surrounding packaging (e.g. a cardboard carton), and the like. Packaging the bar soap composition in a package of the present invention will reduce the amount of water lost due to evaporation upon storage or absorption into the package (Zhang et al, 2007).

RESEARCH METHODOLOGY

The objective of the research was to determine the moisture loss and weight reduction in soap tablets due to evaporation with time when it is stored in shelf. Therefore, the data collection methodology for the research was designed and developed accordingly.

The research was conducted with randomly selecting 24 soap tablets from each of three main soap categories of laundry, bathing and baby soap in order to test the moisture and the weight loss with time. The level of moisture and weight loss determine the actual quality at product delivery as depicted in Figure 1. Total of seven different soaps were investigated. The initial weight of each soap tablet was measured and then stored in a condition which is similar to the actual market storage conditions such as shelf. Two soap tablets from each soap category were taken from storage at the end of each week for testing and the taken soap tablets were removed from storage after testing. The moisture and weight of the soap were measured using laboratory equipment for a three months period. The SPSS software was used to obtain the descriptive statistics of the data set.

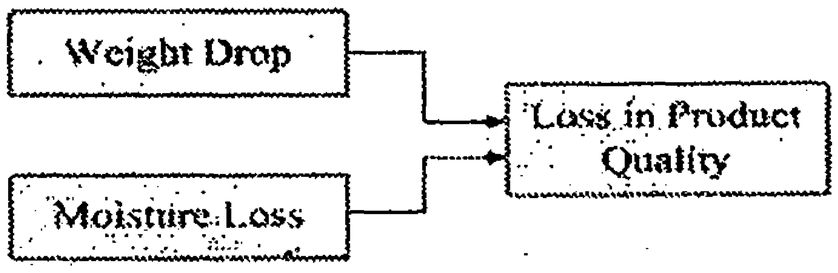

Figure 1: Research Model

DATA ANALYSIS & RESULTS

The following seven different soaps in three categories were selected for the research.

Soap Categories

- Laundry Soap Type A
- Laundry Soap Type B
- Bathing Soap Type A
- Bathing Soap Type B
- Bathing Soap Type C
- Baby Soap Type A
- Baby Soap Type B

Results and the findings of the statistical analysis are presented in the following sections.

Weight Drop and Moisture Loss in Laundry Soap Category during Three Months Time Period

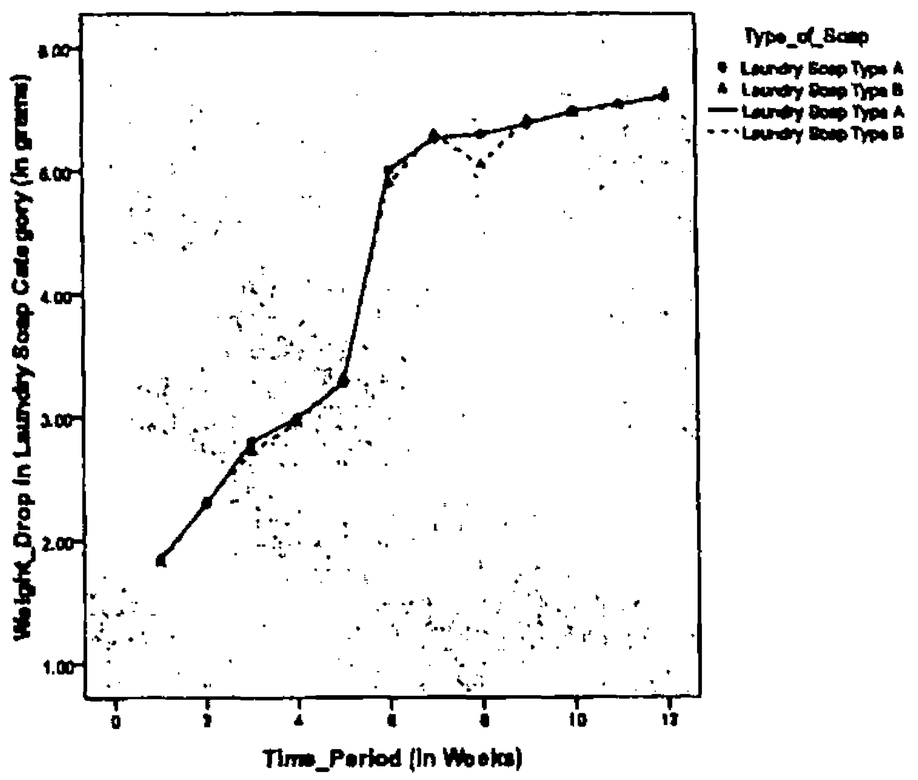

Figure 2: Weight Drop in Laundry Soap Category

Figure 2 indicates that there is a gradual weight drop in both Laundry Soap Types A and B with the pass of time.

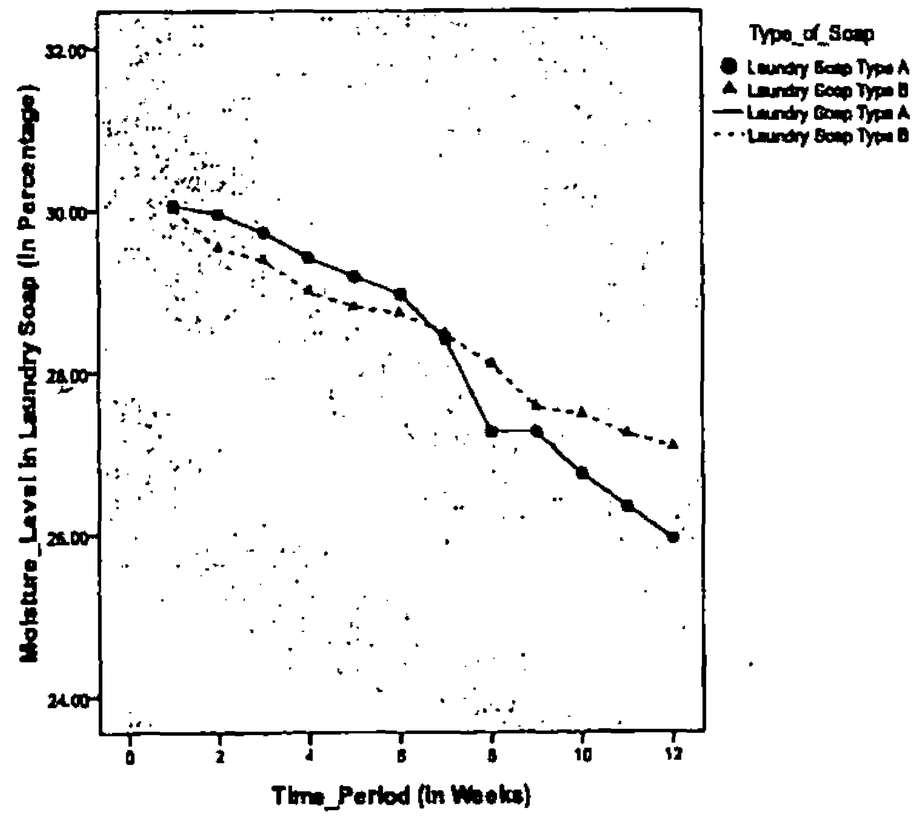

Figure 3: Moisture Level in Laundry Soap Category

It is clear from Figure 3 that the there was continuous dropped of moisture level in both Laundry Soap Types A and B with the time.

Weight Drop and Moisture Loss in Bathing Soap Category during Three Months Time Period

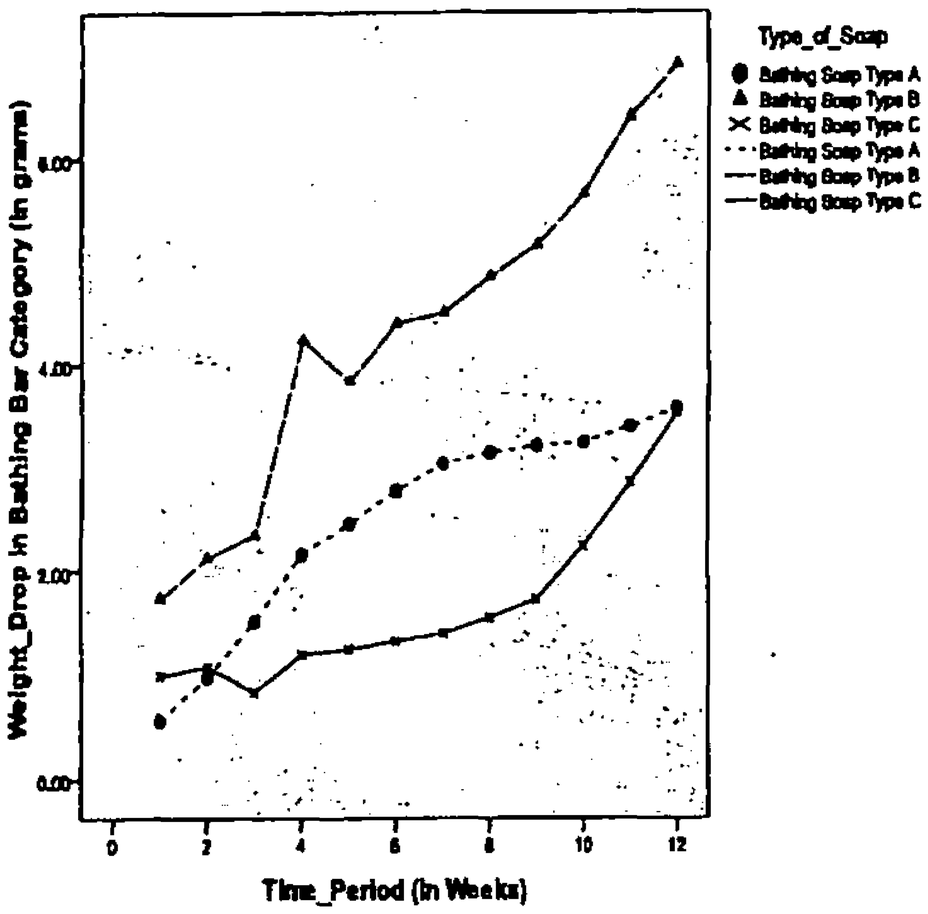

Figure 4: Weight Drop in Bathing Soap Category

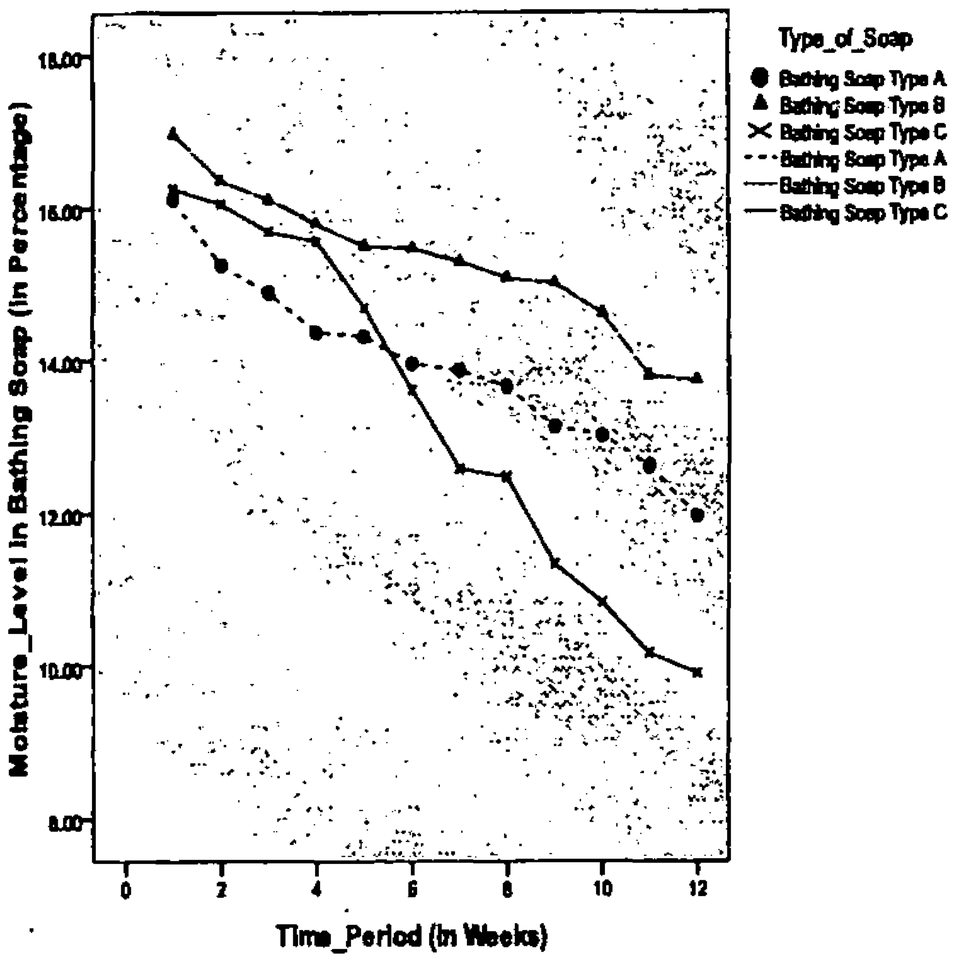

Figure 5: Moisture Level in Bathing Soap Category

Figures 4 and 5 show that all three types of bathing soaps dropped their weight and moisture level during the three months.

Weight Drop and Moisture Loss in Baby Soap Category during Three Months Time Period

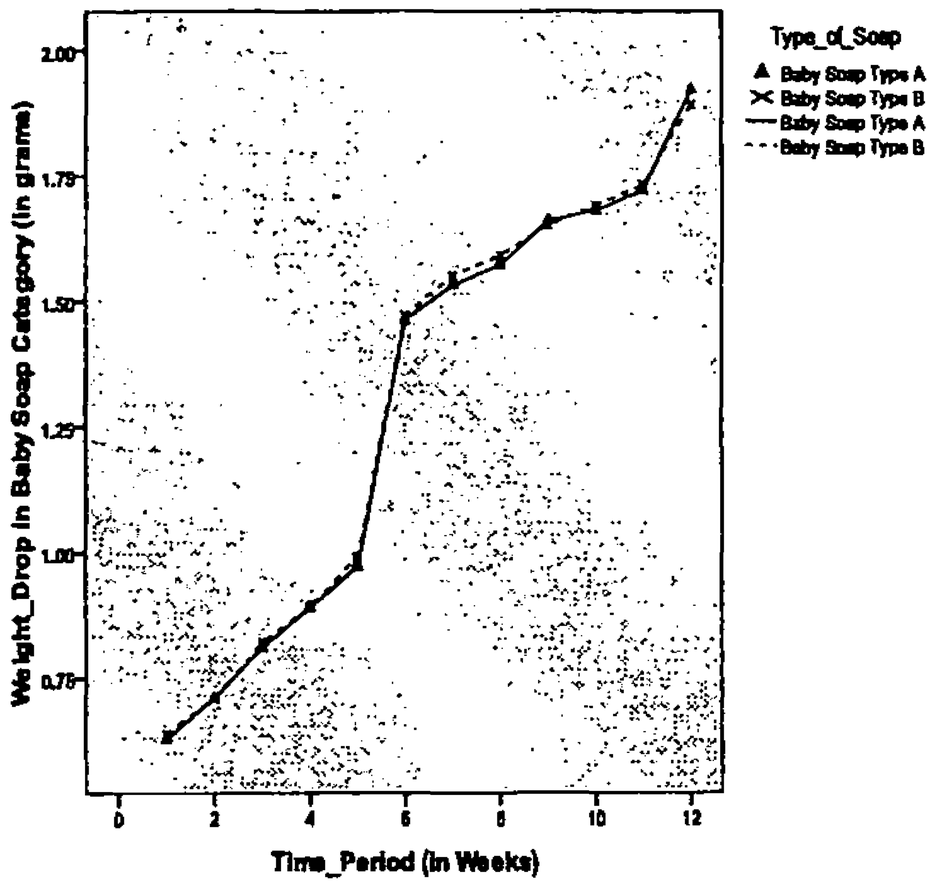

Figure 6: Weight Drop in Baby Soap Category

According to Figure 6 and 7, it is clear that the similar results were recorded in Baby Soap Types A and B during three months time period.

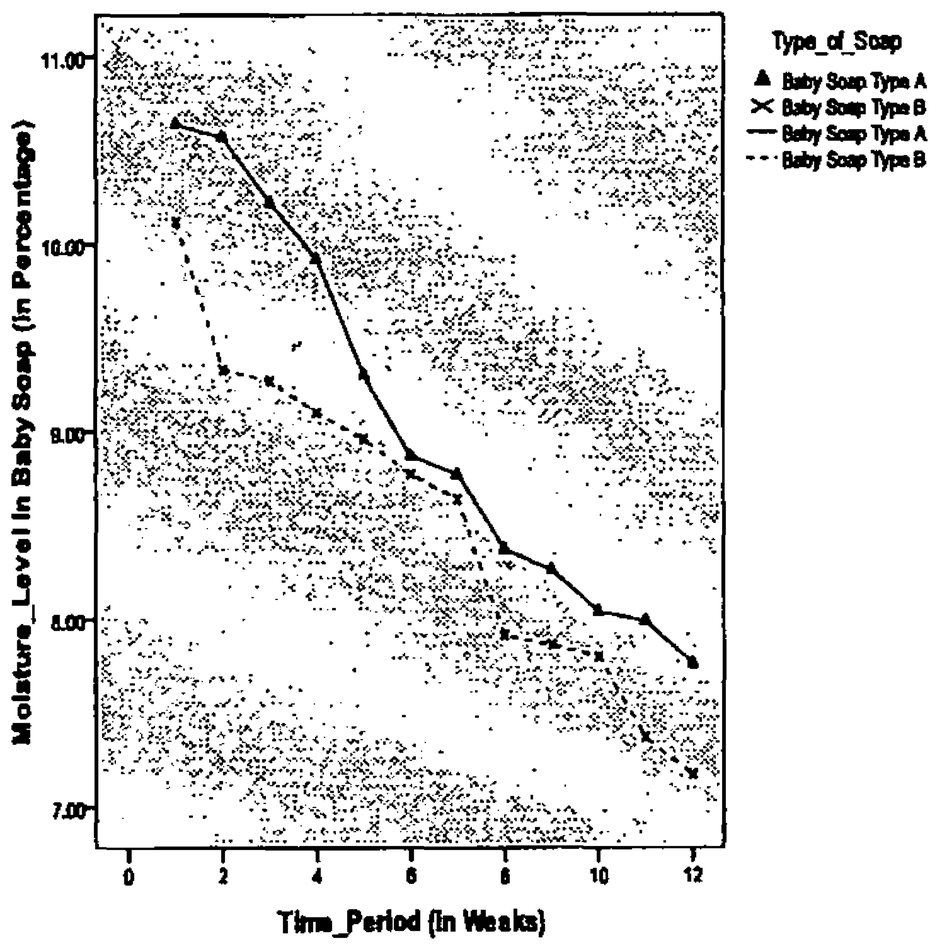

Figure 7: Moisture Level in Baby Soap Category

The final result of the weight and moisture losses at the end of three months were recorded and displayed in Table 01.

Table 01: Moisture and Weight Variation

Soap Category	Moisture Loss % at the End of 3 Months	Moisture Loss % Range (At the End of 3 Months)
Laundry Soap Type A	16.30	11% - 17%
Laundry Soap Type B	11.42	
Bathing Soap Type A	28.51	19% - 29%
Bathing Soap Type B	19.28	
Bathing Soap Type C	22.41	
Baby Soap Type A	17.88	16% - 18%
Baby Soap Type B	16.53	
Soap Category	**Weight Drop % at the End of 3 Months**	**Weight Drop % Range (At the End of 3 Months)**
Laundry Soap Type A	4.56	4% - 5%
Laundry Soap Type B	4.62	
Bathing Soap Type A	3.48	3% - 7%
Bathing Soap Type B	6.58	
Bathing Soap Type C	5.01	
Baby Soap Type A	2.56	2% - 3%
Baby Soap Type B	2.56	

As seen in the Table 01, the result showed that bathing soap recorded the highest loss in moisture (19% - 29%) and weight drop was in between (3% - 7%). Laundry soap recorded the highest percentages of weight drop of (4% - 5%) while lowest weight drop was recorded (2% - 3%) in baby soap category.

DISCUSSION AND CONCLUSION

The findings clearly indicate that all three main categories and seven types of different soaps are losing their main qualities promised moisture level and weight during the shelf life. Thus, this indicates that manufacturers are unable to deliver the officially stated promises to the customer and this would be more deteriorated when the period of products' life in shelf increased. Further as it is obvious the moisture loss of a soap tablet is directly affected to the weight loss of soap tablets.

Based on the findings, it can conclude that the packaging materials and the storage strategies are needed to be re-examined and revised to ensure the promised qualities of all varieties of main soap categories: laundry, bathing and baby soaps. This is very important in order to provide value and return for whole marketing strategies of soaps manufacturers while meeting the product specification as indicated in the packages.

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