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A REVIEW STUDY ON EVALUATION OF DENTAL PRODUCTS

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ABSTRACT

Dental products are mainly used for treating and cleaning the teeth. The products prepared for cleaning surface of the teeth is called dentifrices. The main products used to clean teeth are toothpaste, mouthwash, tooth cleaning powder, chewing gums. These products contain polishing agents, surface active agents, humectants, binding agents. Different methods are used to determine the oral hygiene and its effectiveness. These products do not contain the mono and disaccharides. Natural ingredients are used other then dyes in preparation of dental products. We can determine the fineness, PH, determination of heavy metals, determination of foaming agents, determination of fluoride ions, RDA, determination of moisture contentby using different methods.

KEYWORDS: Dentifrices, Cleaning teeth, Oral hygiene, Effectiveness.

INTRODUCTION

- Dental products are the pharmaceutical preparations widely used in dentistry.
- Dental products can also called as dentifrices.
- These dentifrices can remove the dental plaques.
- Modern tooth paste was developed in 1800s by Dr. Washington Wentworth Sheffield.
- The cosmetic dentifrices can effect on removing the extrinsic staining.
- These products are used to prevent or inhibit tooth decay.

Ideal properties of Dental products

- Good abrasive effect.
- Nonirritant and nontoxic.
- Impart no stain in tooth.

- Keep the mouth fresh and clean.
- Prolonged effect.
- Cheap and easily available.

DEFINITION

A Product developed to clean the oral cavity or treat the oral cavity and remove dental plaques in tooth are called as Dental products.

TESTS OF DENTAL PRODUCTS

Tests For Tooth Pastes, Tooth Powders

A. Evaluation

a. Color

Color of the prepared toothpaste was evaluated for its color. The color was checked visually.

b. Odor

Odor was found by smelling the product.

c. Taste

Taste was checked manually by tasteing the products.

B. Physical characterization test

a. Determination of Ph

Take 1 gm of the tooth paste in a 150 ml beaker and add 10 ml of freshly boiled and cooled water (at 27ºC). Stir well to make a thorough suspension. Determined the pH of the suspension within 5 minutes, using digital pH meter. The results were mentioned.

b. Foamability

The foam ability of the product was evaluated by taking small amount of preparation with

water in a measuring cylinder initial volume was noted and then shaken for 10 times. Final volume of foam was noted.

c. Study of rheological properties

i. Spreadability

The Spreadability is term express to denote the extent of area to which the paste readily spreads on application area. About 1 gm of medicated dental paste was weighed and kept at the center of the glass plate (10 x10 cm) and, another glass plate was placed over it carefully. 1kg weight was placed at the center of the plate to avoid sliding of the plate. Note the diameter of the paste in cms, after 15 min and measure the length moved.

The Spreadability (S) can be calculated using the formula

$$S=m.l/t$$

Where, S- Spreadability.

m- Weight tied to upper glass slide.

l- Length moved glass slide. t-Time taken.

ii. Tube extrudability

The formulation under study was filled in a clean, lacquered aluminum collapsible one-ounce tube with a nasal tip of 5mm opening and applies the pressure on tube by the help of finger. Tube extrudability was then determined by measuring the amount of past extruded through the tip when a pressure was applied on tube.

iii. Viscosity

Paste viscosity measurements were evaluated by using a Brookfield digital viscometer using spindle no.3 by increasing values of the shear rate, in order to reveal possible flowbehavior of the pastes. All viscosities measurements were performed at controlled temperature of 30^0c.

C. Foaming character

This test is specially required for foam forming tooth pastes or tooth powders. Specific amount of product can be mixed with specific amount of water and to be shaken. The foam thus formed is studied for its nature, stability, washability.

D. Limit test for arsenic and lead

This is very important as these are highly toxic metals. Specific tests are there to estimate these two metals; products may not have excess of such metals.

Tests For Mouth Washes And Gels

A. Color and Odor

Physical parameters like odor and color were examined by visual examination.

B. Ph

PH of prepared herbal mouthwash was measured by using digital pH meter. The pH meter was calibrated using standard buffer solution about 1 ml of mouthwash was weighed and dissolved in 50ml of distilled water and its pH was measured.

C. Test for microbial growth in formulated mouthwash

The formulated mouthwash was inoculated in the plates of agar media by streak plate method and a control was prepared. The plates were placed in the incubator and are incubated at 37°C for 24 hours. After the incubation period plates were taken out and checked for microbial growth by comparing it with the control.

D. Stability Studies

The formulation and preparation of any pharmaceutical product is incomplete without proper stability studies of the prepared product. This is done in order to determine the physical and chemical stability of the prepared product and thus determine the safety of the product. A general method for predicting the stability of any product is accelerated stability studies, where the product is subjected to elevated temperatures as per the ICH guidelines. A short term accelerated stability study was carried out for the period of 3 months for the prepared formulation. The samples were stored at under the following conditions of temperature as 3-5ºC, 25ºC RH=60%, 40º C ±2% RH= 75%. Finally the samples kept under accelerated study were withdrawn on monthly intervals and were analyzed.

E. Macroscopic and microscopic tests

The formulations were studied 48 hours after preparation for macroscopic (lumps, color and transparency) and microscopic by optic microscope with magnification of 10 and 40 for uniformity, gel texture and bubbles.

E. Centrifuge test:- Each of the chosen formulations were separately centrifuged in a test tube of 10 cm long and 1 cm width for 5, 15, 30 and 60 minutes with 2000 rpm by Hettich Universal Centrifuge and then studied for sedimentation and gel stability.

G. Temperature change test

To control the formulation stability in different seasons and different temperature conditions, tubes containing formulations were put in temperatures of 2-8°, 25°C and 40-45°C and then their appearance quality was controlled after 48 hours, 1 week, 2 weeks, 1 month, 3 months and 6 months.

H. Melting, freezing, cooling and heating tests

The goal of this test is to study the formulation stability in extreme temperatures. Two sets of formulation test tubes were prepared. One set underwent 6 consecutive periods of temperature changes each including 48 hours in -8°C and 48 hours in 25°C (freezing and melting). The second set underwent 6 periods of temperature changes too but this time each period included 48 hours in 45°C and then 48 hours in 4°C (heating and cooling). After these 6 periods, the formulations qualities were analyzed.

I. Viscosity test

Viscosities were measured by Brookfield (DV-III) viscometer. Each gel was poured into the container and the proper spindle (number 74) was attached. Then the viscosities were measured in 25°C and 50-250 rpm.

J. Release test

This test is done with cell diffusion and synthetic membrane. 1g of the sample was spread over the membrane and the membrane was fixed on top of the cell. The receiving phase of the cell was filled with 37°C purified water and constantly stirred. For 6 hours, every 30 minutes a sampling of 1 ml was done and each time 1 ml purified water of 37°C was added to keep the volume constant. UV absorption of each sample was measured and the concentrations were found using the foline-ciocal method. To calculate the actual concentration of the sample, the following equation was used.

$$Cn=C+(Cn-1)VVt$$

Cn: Actual concentration of drug in sample nC: Pseudo-concentration of drug in sample n

Cn_{-1}: Actual concentration of drug in sample n-1V_t: Total volume

V: Sample volume

Release of the active ingredient from each formulation has its own specific kinetics which is the rate of release based on the time variation. To study the release kinetics, three models of zero order, first order and Higuchi model were studied and their constants were calculated.

K. Mucoadhesion test

The tensiometer (fisher) was calibrated and then the gel came in contact with sodium alginate (substitute for mucin) for 5 minutes. Then the required forces to detach the gels from solution surface (speed of 0.2 inch/min) were determined in dyne/cm^2. This test wasdone 6 times for each formulation.

RESULT AND DISCUSSION

Table 1: Physical evaluation of dental products.

S.No.	Parameters	Observation
1.	Ph	8.7
2.	Spreadability (cm)	7.7cm
3.	Viscosity (CPS)	39751.6cps
4.	Tube Excludability	Good

CONCLUSION

The dental products preparations are designed by using different bases for treatment of gingivitis, periodontitis and dental plaque. During our evaluation studies all the formulations were found to have good PH, good tube extrudability, and good Spreadability, good viscosity, etc. ……..

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