

Confectionery to combat Micro-Sleepiness; Using natural plant based constituents

reported due to micro-sleepiness of the pilot of the aircraft. There is statistical disclosure that road accidents have increased at an alarming rate from 2005 to 2015, and there is a growing trend for these unfortunate events to occur steadily.

Technical Problem

Background

Micro-sleepiness (MS) is a temporary biological disorder, a type of Rapid Eye Movement (REM) sleep which may transpire from a fraction of a second to thirty seconds where the individual fails to respond to arbitrary sensory inputs.

It has become one of the major critical social issues that cause fatalities, material losses, road accidents, quality and productivity dilapidations, lethargic behavior and many kinds of human maladies.

According to the internationally available statistics, micro-sleepiness may cause even one in four fatal road accidents on highways in US, more than 1550 deaths, 71000 injuries, and USD 12.5 Billion monetary losses annually. A few aviation accidents have also been

To combat micro-sleepiness, drowsiness and fatigue several physiochemical and biological methods are being used such as energy drinks, caffeinated beverages, gustatory stimulants, as well as sleepiness detection applications in modern automobiles.

Several studies have also been carried out for driver behavioral changes such as, talking to the passengers, listening to the radio, opening the window and face washing and they have been found to be effective to some extent.

Currently, people who encounter micro-sleepiness also use various types of plant based materials such as beetle, green apple, lime, orange, cardamom, peanuts, clove tea and coffee to combat it. Though these practices have evolved through their indigenous knowledge, actual impact and side effects of these remedial measures have not been scientifically explored or assessed.

Moreover sufferers of Micro-sleepiness use these traditionally identified materials individually without having adequate knowledge over their impact against in combatting micro-sleepiness.

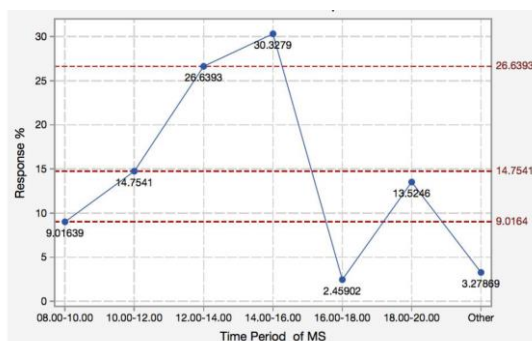


Figure 4.5 Occurrence of MS of the respondents against time periods

Technical Solution

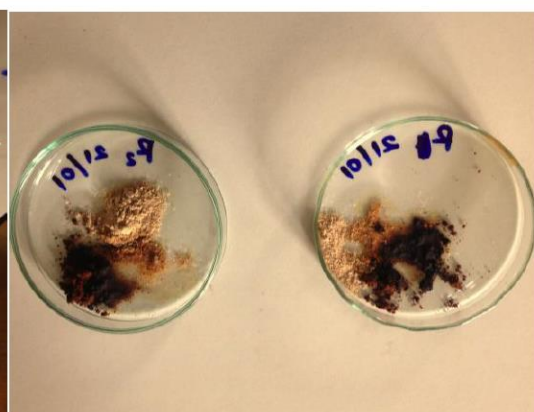
A survey was conducted to assess the response for a confection to combat micro-sleepiness of drivers of the highway, lecturers and students studying for long hours. Locally available plant based raw materials and their phytochemicals were identified and productive extraction techniques were developed and subsequently quantified. The product formulation process was carried out according to the Taguchi orthogonal array and the best treatment out of 08 was organoleptically selected. The developed product was standardized in physical, chemical, and sensorial means and validated in compliance with the national and international standards. Finally efficacy and adverse effects of the developed confection was scrutinized through a comprehensive surveys as well as implementing an eye tracking method. Moreover, appropriate packaging material was selected in terms of texture profile at different time-temperature relationship. Finally a prototype-molding machine was designed and fabricated to mold the product.

Peak level of road accidents was witnessed at 14.00 - 20.00h (38.2%) and intensity of MS also coincided at same period (37.36%). Therefore a strong positive co-relationship between MS and road accidents was identified. According to the preliminary survey, psychological state, bodily status, food habits and diurnal factors were the critical causes to begin MS. Boosting self-confidence levels, maintain active mortar functions using chemical energy, creating gustatory stung, olfactory and tingling actions were the identified as major factors to suppress micro-sleepiness.



According to the eye tracking study respondent eyelid distances were changed as 7.67 ± 1.35 , 7.36 ± 1.37 and 7.87 ± 1.30 for normal eye, under MS and after consuming the confection respectively.

Double laminated (LLDPE/MET.PET-200G) was identified as the best packing material and the developed product was





capable of suppressing MS completely up to 15%, controlled at a satisfactory level up to 65% and fails to control up to 15%, respectively. Further, 30, 35, 20 and 15% expressed that they didn't feel micro-sleepiness for <1, 1-2, 2-3, 3-4 hrs respectively. Thus the developed product is deemed extremely suitable to combat micro-sleepiness without any adverse effects or allergies.

- **Patent filed at National Intellectual Property Office Sri Lanka**
- **Ethical Clearance Obtained**
- **Gold Medal - Awarded by NSF and COSTI**
- **Tabled at the parliament of Sri Lanka on 2017/12/08**
Hansard : 257/17

Advantages

The confection developed to combat micro-sleepiness is extremely cost effective and affordable by the public. In addition to this, it is efficiently made and the losses at production are minimal. It has been proven that there are no adverse health effects or allergies due to consumption of the product hence, it is highly suited to be consumed as a candy to combat micro-sleepiness.

Industrial Applicability

This confection can primarily be produced targeting communities that face the risk of falling into micro-sleepiness.

Active ingredients can be incorporated in to other popular products such as beverages, chewing gums and ointments to diversify the product.

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