

**DEVELOPMENT AND EFFICACY OF A DIETARY SUPPLEMENT: A JELLY STICK
FORMULATION COMBINING BOESENBERGIA ROTUNDA, HONEY, AND CITRUS
AURANTIFOLIA**

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ABSTRACT

The objective of this study is to create and assess a ‘Jelly Stick’ dietary supplement that has the major ingredients of Boesenbergia rotunda, honey, and Citrus aurantifolia. The specific research objectives which were set were as follows: Firstly, it was supposed to identify the context, opportunities, and expectations for this rather specific type of food supplement. Second, it proceeded to the development process of the product where it made sure that all the beneficial properties of the ingredients used in the product were incorporated. The research also aimed at identifying the possible health advantages of this product with emphasis on respiratory allergy. The study used a “Research and Development (R&D)” approach, which entails a particular group for several testing instances. The study revealed that initial results showed a very high level of satisfaction with the programme especially on issues relating to allergy. The study finds that the “Jelly Stick” not only provides for the consumers’ taste buds but also may have some health benefits, adding value and giving a new area of growth to the expanding segment of diet supplements.

Keywords: Dietary Supplement, Jelly Stick, Boesenbergia rotunda, Honey, Citrus aurantifolia, Respiratory Allergy, Product Development

INTRODUCTION

The formation of hypotheses was firmly grounded in the experience of traditional views concerning the primary subjects and modern approaches to research. Among the plants, Boesenbergia rotunda which has been regarded for its traditional medicinal importance for ages provided a promising line of research. Studies such as those by Glayratch (2013) focused on its potential benefits that include respiratory health wellbeing preparing the ground for the primary hypothesis.

In the same regard, the blending of honey and Citrus aurantifolia was reasoned. These components which have been praised separately for their health benefits; honey for its medical benefits and Citrus aurantifolia for its refreshing taste and nutritional values (Kalyakorn & Pornthip, 2008) were assumed to complement each other. Together, their impact was expected to increase the prospect of health improvement, thus leading to the secondary hypothesis. Before going further, one needs to know that hypothesis development is a process that is in a cycle. It is, however, important to note that the preliminary hypotheses, as formulated based on current knowledge and existing literature, went through evolutionary phases due to initial results, collaborative sessions, and scholarly discussions. These iterative processes helped to maintain the hypotheses’ scientific nature and relevance to the research goals.

Year by year, the industry of dietary supplements has grown, reflecting the consumer preference in natural and holistic approach to health. Among the myriad of nature-derived constituents that have received attention, Boesenbergia rotunda, honey, and Citrus aurantifolia stand out because of the possible health benefits that may be derived from them. Presenting these ingredients in a new and creative concept known as ‘Jelly Stick’ is a fine example of how companies have had to adapt to the new trends in consumers’ preferences for easy consumption of the supplement. This academic work aims to explain the idea and assessment of this new product and its likely benefits and the challenges that were likely encountered in its development (Kalyakorn & Pornthip, 2008).

As defined by the experts such as Keller (1993, 1998) and Alexander (1960), strategic branding and marketing have played a large role in the consumers’ decision making process in many sectors, including the dietary supplement sector (Ahmadi et al. , 2023). As this work used the cross-disciplinary approach from the fields of product management (Baldauf, Cravens, & Binder, 2003), advertising

(Kalyakorn & Pornthip, 2008), and public relations (Cutlip & Center, 1978) to understand the position of the product in the market and its chances of success.

With the application of mixed research design, this study sought to provide a rich understanding of the qualitative results and findings of the quantitative results in relation to the use of the ‘Jelly Stick’ supplement (Figure 1). The initial steps of the investigation included focus group discussions with 30 participants across different age groups; it highlighted major consumer trends (Alexander, 1960). Some of the major themes identified were taste, perceived health benefits and convenience similar to those found in definitions of marketing by Alexander (1960) and brand equity by Baldauf, Cravens, & Binder (2003).

The subsequent phase of the trial, namely the randomized controlled trial, was methodical and well planned. The participants were screened according to the age of 25 to 50 years, free from chronic diseases, and having a mild respiratory allergy history. This approach was similar to Marsman & Roe’s (2019) assertion of the need to conduct a strict selection of the participants. A routine of its consumption was set and people were closely monitored for any adverse effects, which is in accordance with the methods used in researches like Figueroa & Genovese (2019) on fruit jellies. Data collection was deemed important and this was done using tools like the questionnaires and health questionnaires similar to the ones used by Mao et al. (2019) and Durazzo et al (2019).

Such theories as the health belief model and the theory of planned behavior formed the basis of the study’s framework. While the former, based on the psychological perspective of health decision-making, provides information regarding the reasons for consuming the “Jelly Stick” supplement, similar to the studies conducted by Arenas-Jal, Suñé-Negre, & García-Montoya (2020). The latter theory is erected on the health belief model and focuses on the interaction of the attitude, subjective norms, and perceived capability. This theoretical underpinning is relevant to the research questions of Kesharwani et al. (2020) and Singh, Paliwal, & Singh (2021).

Combined, these theoretical frameworks which are; Geel, Kinnear, & De Kock (2005), Lopez-Garcia et al. (2014), and Rendon, De Jesus Garcia Salva, & Bragagnolo (2014) offered a strong background to this study. The care taken to adhere to the previous literature helped in the enhancement of the research depth that made the comparison with other related works in the field possible.

In the past, studies have examined the effects of natural compounds in the foods that people take as supplements. Out of these, *Boesenbergia rotunda*, commonly known as fingerroot or Chinese ginger (Figure 2.), has attracted interest due to its pharmacological properties (Glaryatch, C. , 2013). When joining honey, which has well-known therapeutic properties, and *Citrus aurantifolia* with a refreshing taste, a unique product line is created. Marketing communication and promotion plays a crucial role in the marketing of such innovative products to the target market (Alexander, R. S. , 1960; Chanchai, A. , 2008).

As for the conceptual framework of this study, it is crucial to focus on the interdependent relationships between the major components of the product and the expected health benefits. At the heart of this framework is the notion that the mixture of *Boesenbergia rotunda*, honey, and *Citrus aurantifolia* has enhanced health benefits particularly on the respiratory health. As an anti-inflammatory plant (Glaryatch, C. , 2013), *Boesenbergia rotunda* forms the basis of the supplement’s health benefits which seek to eradicate the cause of respiratory diseases. Sugar, being sweet, and known to have some health benefits (Kalyakorn et al. , 2008), will draw the consumer’s attention to the taste and quality of the product. On the other hand, *Citrus aurantifolia* gives a zest to it making the whole user experience different.

Apart from guiding the direction of product formulation, this conceptual framework was also used to inform the research strategy. It determined the choice of the methods of the research, the development of the instruments for the research, and the interpretation of the results (Keller, K. L. , 1993; Kotler, P. , & Keller, K. L. , 2009).

Closely detailed statistic analysis have pointed out the correlation between the consumption of the “Jelly Stick” and the improvement of particular health indicators. A positive relationship with the levels of specific antioxidants was observed in participants in the study, which endorses the antioxidant features of the main constituents, particularly *Boesenbergia rotunda* (Alexander, 1960) . Higher antioxidants may significantly reverse oxidation stress which is reported to impact on allergy expressions.

Additionally, there were indications from participants’ ecological momentary assessment journals and semi-structured interviews of enhanced sleep quality, mood, and energy levels. Such

benefits include; This is due to the general well being associated with honey which in ancient times was used to improve sleep and mood swings (Keller, 1998). The pleasant taste and smell of *Citrus aurantifolia* might have also contributed to the enhancement of participants' mood and sensory profile (Chakorn, 2015).

The analysis of objective characteristics together with qualitative information provides a broader perspective on the supplement's opportunities. However, these results should be discussed in light of the existing changes in the market of dietary supplements. In this regard, the "Jelly Stick" supplement stands out as a promising reference point for the industry, which is characterized by the following features: a novel composition, potential health benefits, and a focus on the consumer.

METHODOLOGY

The study employed both the qualitative and the quantitative research methodologies in the data collection and analysis. The qualitative method was used through focus group discussions to determine the consumers' attitudes and choice towards the product before a quantitative method was employed through a randomized controlled trial to determine the effectiveness of the product. The sample was made up of 200 people, 100 in the control group, and 100 in the test group. The test group took the "Jelly Stick" supplement for a month whereas the control group was given a placebo.

RESULTS

From the mixed method of quantitative and qualitative analysis, (Suksakul, N & Wongleedee, K. 2023). The early outcomes revealed that the level of respiratory allergy symptoms among the tested group was considerably lower than in the control group. Also, the post-consumption survey indicated that the test group had a high level of satisfaction; more than 85 percent of the participants expressed their willingness to continue with the product consumption.

In this regard, the study stresses on the viability of the dietary 'Jelly Stick' supplement for meeting the modern consumer's health requirements. The blend involving *Boesenbergia rotunda*, honey, and *Citrus aurantifolia* not only provides the taste satisfaction but also has the potential health benefits particularly in respiratory allergy.

Analyzing the Consumer Behavior in the Dietary Supplement Business

Consumers' behavior in general and particularly in the context of dietary supplements is a complex interaction of numerous factors including the following: Health beliefs and cultural factors; Marketing factors (Geel et al., 2005). In the past, people have relied on conventional information while choosing their supplements. Herbs such as *Boesenbergia rotunda* that has a long history of use have always been trusted by the consumers (Glaryatch, C., 2013). But today's consumer is more informed and sophisticated and cannot be satisfied with the mere historical backing. They desire products that are backed up by science, accompanied by a clear list of ingredients, and are connected with other aspects of health.

Brand creation and marketing are critical factors that shape consumer perceptions in an industry that can be quite challenging to differentiate products. Consumption of organic ingredients, transparent and sustainability associated products appeal to the changing market trends (Kalyakorn & Pornthip, 2008).

Also, further, digital platforms increase the impact of peer reviews and testimonials. Products that are authentic and have a positive impact on human health receive favourable comments, which contribute to the product's market appeal (Lassar et al. , 1995).

Thus, the decoding of consumers' behavior in the context of dietary supplements requires a systematic approach that combines cultural and market analysis with the latest digital opportunities (Sirirat Sereerattana et al. , 2002). It acts as a compass to the product developers and other players in the market to formulate their strategies (Aeknarajindawat, 2018).

The first challenge is the high competition rate that is felt by the organizations. In such a competitive environment, visibility becomes very important. Of course, one has to commend its creativity as it lies in its originality to aptly communicate the notion of a novel mix to the target consumers, as supported by Kotler & Keller (2009).

Another difficulty is the constantly changing regulations. As the regulatory measures of the health bodies and governments become strict, it becomes mandatory to observe compliance. This goes beyond mere product testing to include sourcing accountability and real marketing stories.

However, these very factors transform into new opportunities. Of all the supplements, “Jelly Stick” with its natural focus and strong research base is the most conspicuous (Arenas-Jal, Suñé-Negre, & García-Montoya, 2020). Also, the digital revolution creates opportunities by breaking barriers to a global audience, and thus, possibilities.

In other words, the problems that can be met in the field of dietary supplements are numerous, but if the product is genuinely and focused on the consumer, as the “Jelly Stick” supplement, it is ready to face them.

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