

A review on the Nutritive Value of Dilis (*Encrasicholina oligobranchus*, Wongratana, 1983) powder and Malunggay (*Moringa oleifera* Lam.) leaves powder, as potential food supplement

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ABSTRACT

Introduction: The high nutritional value of Dilis and Malunggay makes it as one of the most import food in the human diet. Malnutrition is a global concern that needs to be addressed to attain sustainable development thru an innovative means of exploring food resources. **Methodology:** In this review an updated information on Dilis and Malunggay nutritional facts has been synthesized with focused on malunggay leaves and vitamins and minerals profile of dilis per given amount of serving. Other beneficial uses of these essential foods are also considered, through exploration on the written article on the four data base used. **Conclusion:** The nutritional benefits of these food can be maximized as revealed thru processing into a food additive that can add flavor to many dishes and various food delicacies which can further improved nutritional content by coming up with a proportion of the of Dilis and Malunggay powder.

Keywords: Philippine Anchovy, food supplement, plant nutrient, fish vitamins and minerals, malnutrition

1. INTRODUCTION

With the highest number of the undernourished that lives in Asia that reaches 520 million people. The Philippines contributed to this number as shown in the current malnutrition rate of 26.2% among the Filipino Children, which was the highest recorded in the past 10 years (FNRI, 2019). Which resulted to stunting, iron and iodine deficiencies that may impact learning abilities and intelligence of children that eventually affects a person's ability to work and their capacity to live a decent life in the future (Ciriaco, 2019). A mixture of Malunggay and Dilis powder can provide a possible food supplement that may give solution for this alarming concern of malnutrition in the country (BAR-Digest, 2014). On this perspective, the review for Nutritive Value of Dilis and Malunggay is presented in this study.

Fish as primary source of protein and nutrient is significantly contributing for food security (Abba., et al., 2018). Lower content of lysine, an essential amino acid in cereals, can be better complemented from its abundance in fish nutrient that provides a nutritional balance in a human diet. Its consumption is of greater interest because of high content of health significant omega-3, and as an important source for vitamins such as Vitamin A, D and E as well as minerals including calcium, iodine, selenium and other minerals (Elvevoll E and James D, 2000). Among the pelagic fishes, Dilis (*Encrasicholina oligobranchus* , Wongratana, 1983) are nutritious fish that particularly provides protein of high quality that is better than those of meat and egg (FAO, 2015). On the other hand, Malunggay (*Moringa oleifera*) is a plant rich in number of nutrients as such proteins, fibers and minerals that provides an important role in the human diet (Maurya, et al., 2018). Studies show that it is a valuable food crop with apparent nutritive, healing and socioeconomic potentials (Alegbeleye, 2018).

The enshrined objective of UN Sustainable Development Goal of “ending all forms of malnutrition” challenges the world to think and act on malnutrition to focus on all its faces and work to end it by 2030. And to end hunger and malnutrition and attain sustainable development, innovative means can be done by exploring available resource that can be process into food additive to enrich and enhance nutritional content of the human diet which are affordable and accessible to everyone. This study is an initial step towards attaining this goal.

Mechanics for Literature Search for Synthesis

Exploration in electronic data based from Scopus, PubMed, Web of Sci, Scie Direct and Google scholars were done for a peer reviewed scientific articles for the analysis of this study. The key words for the search in the title of the article includes, *M. oleifera*, *Encrasicholina oligobranchus*, Malunggay, Dilis and nutritional value,

malnutrition, fish vitamins and mineral, plant nutrient, human diet. Inclusion of non-peer reviewed article from Newspaper, and technical reports were critically analyzed to have a profound understanding of the subject.

Malunggay as Miracle Tree

Moringa oleifera is classified as a tropical fast growing, deciduous tree (Encyclopædia Britannica,2015), that can grow as high as 7 to 15 m and reach a diameter of 20 to 40 cm at chest height (Mbikay, 2012). Belonging to the Moringaceae family and known to be a vegetable and a medicinal plant. It is found to be growing year-round in tropical regions of the world like the Philippines. The name "Miracle" is derived from the multi-use and multi-purpose nature of the tree parts (Sandeep, et al, 2018).

Nutritional Value of Malunggay Leaves and Other Uses

The leaves of Malunggay are rich in a wide range of vitamins and minerals. As revealed Moringa leaves contain more vitamin A than carrots, more calcium than milk, more iron than spinach, more vitamin C than oranges, and more potassium than bananas. Its protein quality is much higher than of milk and eggs (Kholif et al, 2016). That was quantified as 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach (LakshmiPriya et al, 2016). The richness in nutrition of its leaves are attributed to the presence of a variety of essential phytochemicals that was shown and presented in the given tables below.

As been described in the literature malunggay leaves can be characterized as rich in nutrients and has potential to be used in multiple purposes. This high nutritional content found in the dried leaves are indicators that it can be consumed in powder form and can be used as food additive. Its inclusion in the diets could function as curative and therapeutic therapy that can improve health and nutrition among children and adults with malnutrition (Moyo, et al, 2011).

Dilis: A Little Fish with Big Nutritional Benefits

Anchovies are a small fish that belong to the family Engraulidae. These fish are very small, and they range from around two centimetres to forty centimetres in size. Referred as 'dilis' or 'bolinao' in the Philippines. As salt water, foraging fish more than 100 different species are spread across the Pacific, Atlantic, and Indian Oceans. They are generally found in large schools, which makes them very easy to catch in large quantities. Dilis is full of nutrients and rich in healthy protein that is valuable for both children and adults. It is also a good source of vitamins E & D and minerals like calcium & selenium.

Nutritive Facts of Anchovy

The Department of Science and Technology (DOST) has released a report by the Food and Nutrition Research Institute (FNRI) that shows a 100 grams of fresh dilis (anchovy) contains 752 mg. of calcium almost double (340.55 mg.) found in a cup of milk.

Other Health Benefits of Eating Anchovies

Anchovies are small but contain high amounts of minerals and nutrients. The high amounts of omega-3 fatty acids, healthy unsaturated fats help to prevent inflammation and cardiovascular diseases. Its high content of calcium and magnesium and essential minerals can control blood pressure and circulation. Its niacin content contributes in the lowering of cholesterol and triglycerides. That minimizes the risk for cardiovascular diseases (Anand, et al., 2015). Moreover, the calcium, magnesium and phosphorus, support the body maintenance and improvement bone health and growth, promoting skeletal health (Go, et, al. 2014). Its abundance in protein is responsible for cell metabolism and tissue repair that gives a healing effect in the body. It contains a lower content of calorie with a higher amount of protein that makes the body feel full, while also limiting your calorie intake that resolves issue on weight gain (Mercola, 2017). Furthermore, it can be a great source of healthy fats such as docosahexaenoic acid (DHA) that are essential for a child's developing brain, nervous system and vision (Council on Environmental Health, 2019).

The Union of the Malunggay and Dilis

Fish can be considered as a good source of several minerals, vitamins and micronutrients hence with a high nutritional value that impact on human health (Tilami & Sampels 2017). Fish proteins can improve the overall protein quality of a mixed diet (Mohanty and Singh, 2018). This is due to the presence of minerals in fish like iron (Fe),

Calcium (Ca), Zinc (Zn), Phosphorus (P), Selenium (Se), Fluorine (F), Iodine that are high bioavailability that can easily absorbed by the human body (Jag Pal, et al, 2018). Complementary the human body require sufficient intakes of many mineral elements for their wellbeing with a significant amount of sodium (Na), selenium (Se), cobalt (Co) and iodine (I) in their diet and a little amounts of fluorine (F), lithium (Li), lead (Pb), arsenic (As), vanadium (V), chromium (Cr), and silicon (Si) that can be derived from plant products (White, et.al., 2012). Historically, humans evolved to digest primarily plant foods as shown in set of 32 teeth that include 20 molars, which are perfect for crushing and grinding plant foods, along with eight front incisors which are well suited for biting into fruits and vegetable (Chronicle, 2020) hence it is favorable for human body to consume more plant food. In fact, the famous Mediterranean Diet is a combination of much of the vegetables and a little of meat and fish (National Geographic Magazine, 2013). Which has practically been applied in the developing a food additive that is made of mixture of Malunggay and Dilis, the study recommended the ratio of 2:1 and reported to have achieved (3%) carbohydrates, (5%) protein, (40%) vitamin A, (2%) vitamin C, (40%) calcium and (10%) iron for every 100 grams of mixture of dilis and malunggay powder (Bar-Digest, 2014).

2. CONCLUDING REMARKS AND WAY FORWARD

Literature shows that Malunggay contains as many essential nutrients that can used as nutritional supplements. A dietary supplement that can be dried and turned into powder for use in several food preparations. Combined with Dilis a good source of healthy fats and other nutrients like protein that provides an amino acid which the body can use to maintain healthy tissue and aid in immune system function. With nutritional and health benefits maximized within the mixture, a highly nutritious and in expensive food supplement can be developed which can help address issues on malnutrition. Further studies on the food product development with inclusion of proportion of malunggay and dilis content may be conducted. Analysis of sufficient amount of malunggay and Dilis that may meet the Required Daily Allowance (RDA) for Iron and Iodine in a developed food product may also be considered.

Conflict of Interest

There is no conflict of interest in this study.

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