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MORINGA OLEIFERA: A NEW HOPE ON BREAST CANCER TREATMENT

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Moringa oleifera is a species that comes from the kingdom Plantae, division Magnoliophyta, class Magnoliopsida, order Brassicales, family Moringaceae, genus Moringa. *Moringa oleifera* are known to go by many names such as Horseradish tree, Benzolive, Drumstick tree, "Sajna", "Kelor", "Saijihan", and "Marango". The name of the plant was bestowed by botanist Carl Linnaeus with the scientific name "*Moringa oleifera*." The plant's genus name "Moringa" originates from the Tamil word "murungai" and the Malayalam word "muringa," both of which pertain to the plant. The species name "oleifera" is derived from the Latin word "oleum," signifying oil, and alludes to the plant's seeds that are abundant in oil. *Moringa oleifera* is known by several other names, including drumstick tree, horseradish tree, ben oil tree, and miracle tree. *Moringa oleifera* also known to the locals in Malaysia as "*pokok kelor*."

Moringa oleifera can be found in many tropical and subtropical climate countries. *Moringa oleifera* is native to the sub-Himalayan regions as it grows on Himalayan foothills. Nowadays, *M. oleifera* can also be found in Africa, Arabia, South East Asia, the Pacific and Caribbean Islands and South America.



Figure 1. *Moringa oleifera* taxonomic classification.

Moringa oleifera tree leaves usually consist of compound leaves with numerous small leaflets connected to a central stem. The leaflets generally have an oval or elliptical form. Seeds typically appear elongated and somewhat triangular. The pods, often known as drumsticks, are elongated and slender, resembling the shape of an actual drumstick. In summary, the shape of *Moringa oleifera* can be characterized as that of a medium-sized tree featuring compound leaves forming a canopy and elongated seed pods.

Breast cancer is one of the most common cancers in the entire world including Malaysia. In Malaysia, breast cancer represents 19% of cumulative cancer cases. Breast cancer also represents 34.1% of total cancer cases for female patients. Breast cancer starts when a tumour grows from a single cancer cell. Later, the cancer cells will start invading surrounding tissue. Some of the cancer cell may spread throughout the body via blood and lymph vessels. There are a number of symptoms that indicate the presence of cancer in the breast which are swelling, change in the size or shape of a breast, irritation, dimpled skin, flaky skin, breast pain, nipple discharge, and swollen lymph nodes.



Figure 2. *Moringa oleifera* distribution. (Source: <https://www.renature.co/commodities/moringa/>)

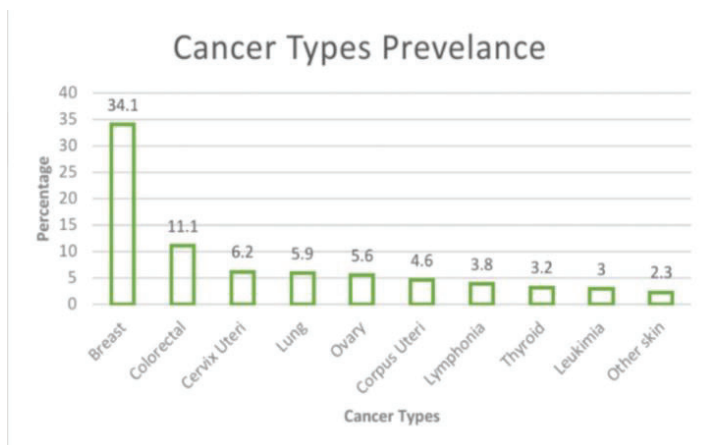


Figure 4. Different types of cancer in Malaysia. (Source: Ministry of Health, 2019)

There are five main treatments for breast cancer which are chemotherapy, surgery, radiotherapy, hormone therapy and targeted therapy. However, the treatment of breast cancer is not limited to modern treatment. Throughout the year, humankind has been using the herb to fight many diseases and cancer is not an exception.

Moringa oleifera contains valuable nutrients. *Moringa oleifera* leaves are mineral rich as the leaves contain calcium, potassium, zinc, magnesium, iron and copper (Gopalakrishnan et al., 2016). Besides, *M. oleifera* also contains vitamin A, vitamin B such as folic acid, pyridoxine and nicotinic acid, vitamin C, D and E. Phytochemicals such as tannins, sterols, terpenoids, flavonoids, phenolics, saponins, anthraquinones, alkaloids and reducing sugar are present in *M. oleifera*. However, *M. oleifera* nutrients vary depending on the location of the tree, climate of the surrounding and other environmental factors. Previous research conclude that vitamin A was abundant in the hot-wet season, while vitamin C and iron were abundant in the cool-dry season.



Figure 4. *Moringa oleifera* leaves.

Moringa oleifera are widely known for the antioxidant properties residing inside the leaves. Antioxidant properties from the leaves have a capability to prevent cancer cells growth, exhibit as anti-inflammatory, cardioprotective, hepatoprotective and anti-ulcer natures. However, the medicinal properties of *M. oleifera* depends on geographical and climate factors. This is due to the phytochemicals nature that are very sensitive towards sunlight exposure, heat exposure, soil pH value and humidity.

Moringa oleifera possesses antioxidants that aid in counteracting the impact of free radicals within the body. These antioxidants, like vitamin C, beta-carotene, and assorted polyphenols, work to stabilize the harmful effects caused by unstable molecules, which are known as free radicals. Free radicals are unstable molecules that have unpaired electrons. Free radicals are known to attack DNA molecules, causing mutation and genetic material to change. This mutation can lead to cancer. Antioxidant properties from *M. oleifera* are capable to inhibit the free radicals by donating electrons to the unstable molecules therefore naturalised the threats.

Due to the fact that the amount of antioxidant or anticancer properties may vary based on the geographical and climatic factors, it is hoped that research on *M. oleifera* can be carried out in more depth in the future study to capitalise the potential and benefits of *M. oleifera* in breast cancer treatment.