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# Anticancer properties of daily-consumed vegetables *Amaranthus spinosus*, *Ipomoea aquatica*, *Apium graveolens*, and *Manihot utilisima* to LNCaP prostate cancer cell lines

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## ABSTRACT

**Introduction:** Prostate cancer is the second most common cancer in men worldwide. Efforts on finding potential sources from daily consumed foods that inhibit prostate cancer development are becoming important objective for scientists. Previous epidemiologic studies have consistently shown that consumption of fruit and vegetables was found to have significant contribution in the prevention of cancer. Thus in this study, we investigated the anticancer potency of popular vegetables consumed in Indonesia, namely, *Amaranthus spinosus*, *Ipomoea aquatica* Forsk., *Apium graveolens* L., and *Manihot utilisima* to Lymph Node Carcinoma of the Prostate (LNCaP) human prostate cancer cell lines. **Materials and Methods:** The extracts were tested for Brine shrimp lethality test to guide their cytotoxic potencies, and methyl thiazolyl tetrazolium assay to LNCaP cells for their anticancer properties. **Results:** The results showed that *I. aquatica* Forsk has the most potential anticancer sources, with LC<sub>50</sub> against *Artemia salina* and Inhibition Concentration (IC)<sub>50</sub> against LNCaP being 266 µg/mL and 400 µg/mL, respectively. **Conclusions:** Our preliminary result suggest that *I. aquatica* Forsk. has the potential to be further investigated and developed as anticancer sources.

**Key words:** Brine shrimp lethality test, LNCaP, methyl thiazolyl tetrazolium assays, prostate cancer

## INTRODUCTION

As consequences of increases in welfare, public health, and nutrition as well as changes in population, there were also changes in patterns of degenerative diseases such as heart disease, diabetes, and cancer. According to Laborer's Health and Safety Fund of North America, one in every six men will get prostate cancer sometime in his life. Those who involve in heavy work and exposure to certain metals and chemicals are at high risk for prostate cancer.<sup>[1]</sup> Thus, although it has been money and time consuming, researches to find agents to use in the prevention or treatment of prostate cancer have become the main target of many scientists.<sup>[2]</sup>

High intake of fruits and vegetables is consistently related to lower risk of cancer.<sup>[3]</sup> In most cancer, persons with low fruit and vegetable intake experience about twice the risk of cancer compared with those with high intake, even after control for potentially confounding factors.<sup>[4]</sup> Furthermore, the risk of prostate cancer increases with diet that is

high in fat, low in fiber, and has few servings of vegetables.<sup>[1]</sup> Therefore, the National Cancer Institute encouraged to consume fruits and vegetables every day to reduce fat, and give high fiber diet.<sup>[5]</sup> In addition, scientific evidence have suggested that differences in diet and lifestyle may account in large part for the variability of prostate cancer incidences in different countries; thus, nutrition may play an important role in reducing the incidence and the risk of prostate cancer progression.<sup>[6]</sup>

Herbal medicine has been universally accepted and has provided a great impact in the world of health and international trade. Therefore, it plays an important role to the human population worldwide.<sup>[2]</sup> The study of medicinal plants which have toxicity is the first step to find anticancer compounds.<sup>[7]</sup> One of the famous vegetables, broccoli, is known as anticancer as scientists have reported the benefits of its active compound sulforaphane in cancer prevention.<sup>[8,9]</sup> As part of efforts in finding potential sources that inhibit prostate cancer development from daily consumed

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