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An ethnopharmacological survey of medicinal plants traditionally used for cancer treatment in the Ashanti region, Ghana

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ABSTRACT

Aims: Cancer represents a major health burden and drain on healthcare resources in the world. The majority of the people of Africa still patronize traditional medicine for their health needs, including various forms of cancer. The aim of the following study is the identification of medicinal plants used for cancer treatment by the traditional healers in the Ashanti area of Ghana and to cross-reference the identified plant species with published scientific literature.

Methodology: Validated questionnaires were administered to 85 traditional healers in 10 communities within Ashanti region. For cross-validation, also 7 healers located outside Ashanti region were investigated to evaluate regional differences. Interviews and structured conversations were used to administer the questionnaires. Selected herbal material dominantly used by the healers was collected and identified.

Results: The ethnopharmacological survey revealed 151 plant species used for cancer treatment. Identified species were classified into different groups according to their frequency of use, resulting in the "top-22" plants. Interestingly group I (very frequent use) contained 5 plant species (*Khaya senegalensis, Triplochiton scleroxylon, Azadirachta indica, Entandrophragma angolense, Terminalia superba*), three of which belong to the plant family Meliaceae, phytochemically mainly characterized by the presence of limonoids. Cross-referencing of all plants identified by current scientific literature revealed species which have not been documented for cancer therapy until now. Special interest was laid on use of plants for cancer treatment of children.

Conclusion: A variety of traditionally used anti-cancer plants from Ghana have been identified and the widespread use within ethnotraditional medicine is obvious. Further *in vitro* and clinical studies will be performed in the near future to rationalize the phytochemical and functional scientific background of the respective extracts for cancer treatment.

1. Introduction

Cancer has a tremendous impact on the healthcare economy and represents a major health burden and drain on healthcare resources worldwide. It is estimated that 70–80% of patients in Africa, and also in Ghana, are treated by traditional healers and herbal practitioners (Nyika, 2007). People in Africa often rely on traditional medicine for their health needs because of the high costs of conventional medicines, inadequate health facilities and healthcare professionals, coupled with a lack of training of health workers for many different diseases (Mahé et al., 2005). Traditional medicines and medicinal plants used for cancer treatments are easily available and affordable, sometimes free of charge. Most of the herbal materials for preparation of the medical formulations have been used for a long time and are assessed to be safer than isolated active compounds (Fabricant and Farnsworth, 2001). Ethnopharmacological investigations on medicinal plants, traditionally used for cancer treatment, have recently been reviewed using scientific data-bases (Tariq et al., 2017), but the identification of unknown plants for this medical use in rural areas is still a hot topic.

Because of the huge reservoir of traditional knowledge on plants used for traditional cancer treatment in West Africa, the following study was performed in central Ghana to obtain validated, quantitative and reliable data on the use of medicinal plants for this therapy in an exactly defined part of the country, the Ashanti region, surrounding the

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regional capital Kumasi. Several reasons have led to the selection of this special study area: the high biodiversity within a typical tropical rainforest area; a mixture of people living in rural as well as in metropolitan areas; the existence of an intact and modern infrastructure, including state-of-the art medical centers and hospitals and a traditional healers community cooperating with the modern medical facilities; the Ashanti community of people from this area with a strong cultural and historical background, preserving own traditional knowledge, but strongly interacting also with modern economy and science. Interstingly, in 2012 this region has also established a population-based cancer registry to collect population-based data on cancer to provide case reports of cancer patients within the city of Kumasi (Laryea et al., 2014). According to this database, the most common cancers among males were diseases of the liver (21%), prostate (13%), lung (5%) and stomach (5%). Among females, the most common cancers were those of the breast (34%), cervix (29%), ovary (11%) and endometrium (5%) (Laryea et al., 2014).

Aims of this study were to find out how traditional healers in this area recognize cancer and how they classify and treat the disease with medicinal plants. Additionally, special emphasize was layed on anticancer plants for treatment of children. It was to be investigated how the respective plants were collected and identified, which part of plants are used, how they are obtained, prepared and applied for the treatment of cancer and what importance these plants have to the healers beside other non-plant based methods within the management of cancer.

2. Material and methods

2.1. Study area and survey

The ethnopharmacological survey was performed in Ashanti region in the central part of Ghana, located between 0.15–2.251W and 5.50–7.461N (Fig. 1). The region shares boundaries with four of the 10 political regions of Ghana. The region covers a total land area of 24,389 km^2, representing 10.2% of the total land area of Ghana. The ethnopharmacological survey was carried out from October 2012 to February 2013 in accordance with the national rights of Ghana and with acceptance and in close co-operation with Ghana Federation of Traditional Medicine Healers Association (GHAFTRAM), an umbrella organization including all traditional healers such as herbal practitioners, fetish priests, divine healers, psychic practitioners and traditional medicine practitioners in Ghana. The selection of the healers for the interviews was based on a list provided by the Ashanti regional branch of GHAFTRAM and we visited them in their homes and herbal or practice centers. All participants were informed about the survey and personal visits were made to their facilities, centers and homes. In respect to the local tradition, some gifts in cash or kinds were given. Interviews and conversations were used to administer the questionnaires. Questionnaires were designed in English and administered to 78 traditional healers and herbal practitioners who represent 60% of all GHAFTRAM members in the region. To compare potential differences between healers from Ashanti and regions outside Ashanti additionally questionnaires from non-Ashanti respondents were investigated to evaluate regional differences.

Responders i.e. healers were asked to provide samples of the plant materials after the administration of the questionnaires and interviews. These samples were identified by the accompanied botanist/taxonomist and his team and the samples of the plant materials were prepared as voucher specimens. Some healers requested that they needed to collect them from the forest or wild sources and hence they got additional time for the subsequent collection.

Voucher specimens (Table 1) of all plants have been deposited in the Ghana Herbarium, Department of Plant and Environmental Biology, University of Ghana, with defined ID-numbers. Plants were identified by Prof. A. Asase, Department of Plant and Environmental Biology, University of Ghana, Legon, Accra, Ghana.

2.2. Literature based validation of the data

Plant species obtained from the questionnaires were cross-checked via The Plant List (www.theplantlist.org) for the accepted name of the species. The databases SciFinder® and PubMed were used to compare

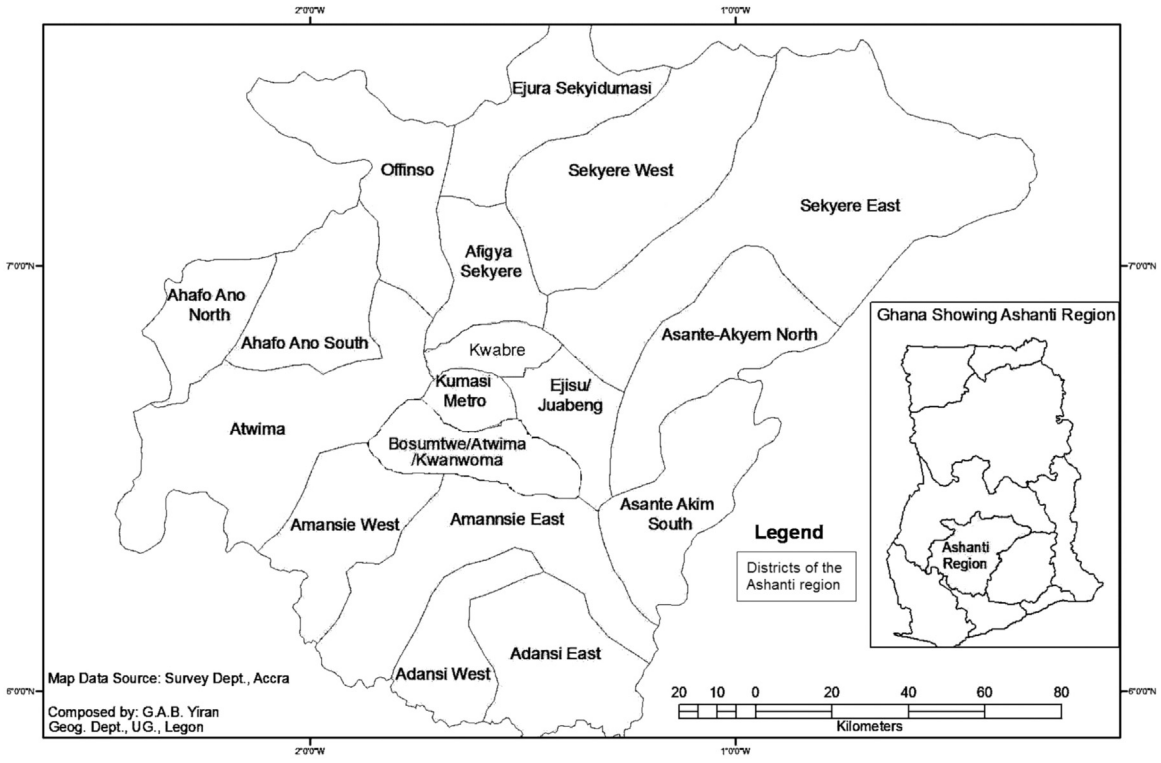

Fig. 1. Map of Ghana with Ashanti region with detailed boundaries of the districts (study area).