

## Short Communication

# Cytotoxicity evaluation of selected Nigerian plants used in traditional cancer treatment

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Herbal medicines have received much attention as a source of new anticancer drugs. However, scientific studies have been conducted to a limited extent with few medicinal plants. This study investigates the cytotoxic activity of some Nigerian medicinal plants used locally in the treatment of cancer. The ethanolic extracts of five plants were evaluated using the MTT assay on the HT29 and MCF-7 cell lines. *Sapium ellipticum* leaves showed a greater cytotoxic activity than *Combretum paniculatum*, *Celosia trigyna*, *Drymaria cordata* and *Cyathula prostrata* and it was comparable to the activity of the reference compound Cisplatin in the MCF-7 cell line. In the HT29 cell line, all the plants showed less than 50% activity at 500 µg/ml. The results showed that *Sapium* exhibited a greater cytotoxic activity than all the plants tested and this provides scientific evidence to support the traditional use of the plant.

**Key words:** *Sapium*, traditional medicine, cytotoxicity, cancer, cisplatin.

## INTRODUCTION

The use of plants and their products for medicinal benefits has played a significant role in nearly every culture on earth. Historically all traditional remedies were obtained from plants and recent estimates have suggested that several thousands of plants have been known with medicinal applications in various cultures (Richardson, 2001; Wargovich et al., 2001). Local herbalists have been treating various cancers- and cancer-related conditions for ages (Sofowora, 1984). Many plants have been reported to be useful in the management of such conditions. Plants have been the source of well known anticancer drugs such as camptothecin, podophyllotoxin and paclitaxel (Wani et al., 1971; Stahlhut et al., 1999; Lee, 2004). In this paper, we report the cytotoxic activity of the ethanolic

extracts of *Sapium ellipticum* (Krauss.) Pax., *Combretum paniculatum* Vent., *Celosia trigyna* L., *Drymaria cordata* (Linn.) Willd. and *Cyathula prostrata* (Linn.) Blume against colon and breast cancer cell lines. Selection of these plants was based on their frequency in recipes for the management of cancer from an ethnobotanical survey of traditional medical practitioners in South-Western Nigeria and our earlier investigation on the cytotoxic activity of some anticancer plants using the HeLa cell line (Sowemimo et al., 2009).

## MATERIALS AND METHODS

### Plant material

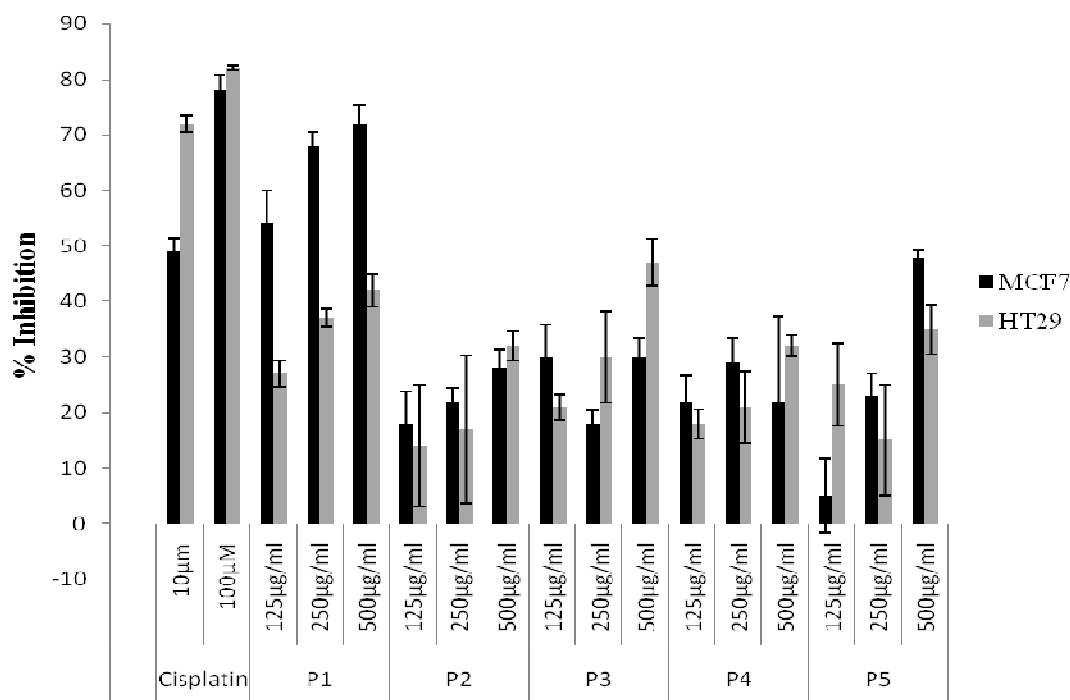
The plants were collected from the Olokemeji Forest Reserve and the Campus of Obafemi Awolowo University, Ile-Ife in Nigeria in October, 2006. They were authenticated by comparison with corresponding herbarium specimens by Mr Daramola at the Forestry Research Institute, Ibadan, Nigeria (FRIN) where voucher specimens were also deposited. The plants were dried in a hot air

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**Table 1.** List of plants used in the cytotoxicity assay against HT29 and MCF-7 cells

Extract number	Plant name (family) [Frin no. <sup>a</sup> ]	Plant part used
P1	<i>Sapium ellipticum</i> (Krauss.) Pax. (Euphorbiaceae) [108265]	Leaves
P2	<i>Combretum paniculatum</i> Vent. (Combretaceae) [107980]	Leaves
P3	<i>Celosia trigyna</i> L. (Amaranthaceae) [84438]	Whole plant
P4	<i>Drymaria cordata</i> (Linn.) Willd. (Caryophyllaceae) [107678]	Whole plant
P5	<i>Cyathula prostrata</i> (Linn.) Blume (Amaranthaceae) [107232]	Whole plant

<sup>a</sup> FRIN No.: Herbarium number of collections lodged at the Forestry Research Institute (FRIN) at Ibadan



**Figure 1.** Results of extracts on MCF-7 and HT29 cancer cells. Results represent the mean  $\pm$  standard deviation of quadruplicate determinations. Cisplatin was used as positive control. P1-*S. ellipticum*, P2 – *Combretum paniculatum*, P3- *Celosia trigyna*; P4-*D. cordata*; P5- *Cyathula prostrata*.

oven at 40°C, ground to powder and stored in amber coloured bottles. 100 g each of powdered plant material was macerated with 80% ethanol at room temperature respectively. The resulting extracts were filtered and concentrated to dryness *in vacuo* at room temperature. Table 1 shows the various plant parts used in this work.

### Cytotoxicity assay

The method of Koduru et al. (2007b), a modification of the MTT assay (Mossmann, 1983) was used to determine the cytotoxic effect of the plant extracts on HT29 (colon cancer) and MCF-7 (breast cancer) cell lines. The cells were seeded into 96-well culture plates (Nunc) at 6000 cells/well in RPMI1640:10% fetal bovine serum (FBS) and left for 24 h. Plant extracts or cisplatin (positive control) were added and the cells incubated for a further 48 h after which the medium was replaced with 200 µl MTT (Sigma) (0.5 mg/ml in RPMI 1640:10% FBS). The MTT was removed after further 4 h

incubation at 37°C and the purple formazan product dissolved in DMSO. The absorbance was measured at 540 nm on a multiwell scanning spectrophotometer (Multiscan MS, Labsystems). All incubation steps were carried out in a 37°C humidified incubator with 5% CO<sub>2</sub>.

### RESULTS AND DISCUSSION

Figure 1 shows the cytotoxicity results with extract numbers corresponding to those in Table 1. Cisplatin caused 48.5  $\pm$  2.41, 78.0  $\pm$  0.61 and 72.0  $\pm$  1.47, 82.0  $\pm$  1.31 (SD, n=4) at 10 and 100 µM inhibition for MCF-7 and HT29 respectively. In the MCF-7 cell line, *Sapium* had comparable activity to the positive control Cisplatin for all the concentrations tested. *Cyathula* showed a 50% inhibition at 500 µg/ml while *Combretum*, *Celosia* and

*Drymaria* showed inhibition lower than 50% for all the concentrations tested. However, in the HT29 cell line none of the tested plants extracts showed inhibition comparable to the control drug Cisplatin. All the plant extracts showed inhibition less than 50%.

Of all the extracts tested, *Sapium* leaves showed the highest activity and this was also observed in our earlier work with the HeLa cell line (Sowemimo et al., 2009). The plant has also been reported to have antioxidant activity (Adesegun et al., 2008) and this may have a role to play in the observed activity in the cancer cell lines as antioxidants play a complex role in cancer prevention. Our results justify its inclusion in traditional recipes for cancer treatment and thus indicate its potential for biopharmaceutical use. It is suggested that the plant be taken for further bioassay guided experiments in order to isolate its bioactive principles.

## ACKNOWLEDGEMENTS

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