Bioactive compounds content of traditional sorghum beer (tchapalo) produced in Côte d'Ivoire

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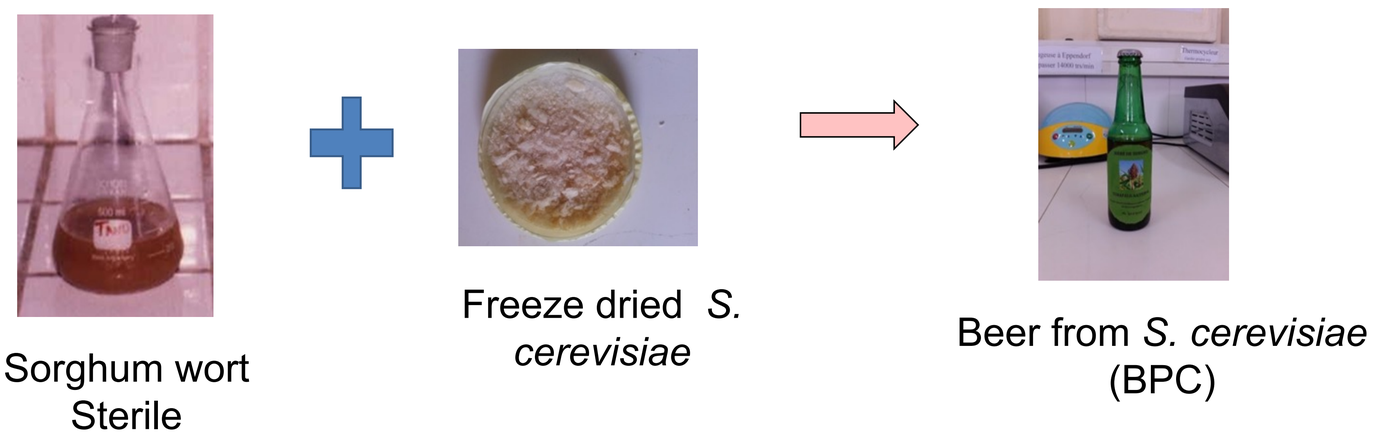
1- Introduction

Sorghum (*Sorghum bicolor* (L.) Moench) plays a crucial role in food security in developing countries and abundantly used to prepare traditional beers commonly named sorghum beers or opaque beers but known as *pito* or *burukutu* in Nigeria, *chibuki* in Zimbabwe, *dolo* in Mali and Burkina Faso, and *tchapalo* in Côte d'Ivoire.

The success of traditional sorghum beer was related to the low price and the therapeutic characteristics (laxative and antimalarial properties) attributed to it by consumers. Since it has been shown that sorghum, contains large quantities of phenolic compounds with considerable antioxidant activity, it may be assumed that at least part of the alleged therapeutic effects of sorghum beer can be attributed to these compounds. Due to the ethno-pharmacological importance of traditional sorghum beer (*tchapalo*), the present study was designed to assess its phenolic compounds, diet fibers, antioxidant activity and antimalarial compounds comparatively to two industrials beers.

2-Methods

- **Beers production**



Conditions of fermentation

Inoculation rate: 1% (10^6-10^7 UFC/mL)

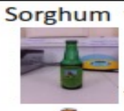
28 °C; 32 hrs 120 rpm

- **Phytochemical analysis of sorghum wort and sorghum beers** (Total phenols, Total tannins, Total anthocyanins, Total flavonoids)
- **Antioxidant activities: Antiradical activity: DPPH** (2,2-diphenyl-1-picryl-hydrazyl); **Ferric reducing-antioxidant power: FRAP** (potassium ferricyanide ferric chloride)
- **Chemical analyses**

Compounds with antimalarial properties (chloroquine, quinine formate, quinine dihydrochloride); **Diets fibers**

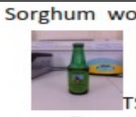
3-Results

Table 1 : Phytochemical composition in sorghum wort and beers

	Total Phenols (µg/mL GAE)	Total Tannins (g/L)	Total Flavonoids (µg/mL QE)	Total Anthocyanins (µg/mL)
Sorghum wort	1254.69±2.31 a	13.035±1 a	106.99±2.94 a	664.12±1.56 a
 TSB	273.53±4.23 b	3.68±2 b	39.21±0.45 b	7.87±0.12 b
 IMB	216.48±4.94 c	39.53±0.23 c	13.26±0.19 c	3.79±1.79 c
 IRB	267.50±4.23 b	42.28±1.14 c	14.61±0.19 c	4.66±0.5 c

Values are means ±standard deviation, n= 3. Means in the same column with different letters are significantly different according to Tukey's test ($p < 0.05$). TSB : traditional sorghum beer ; IMB : Industrial maize beer ; IRB : Industrial rice beer

Table 2 : Antioxidant activities of sorghum wort and beers.

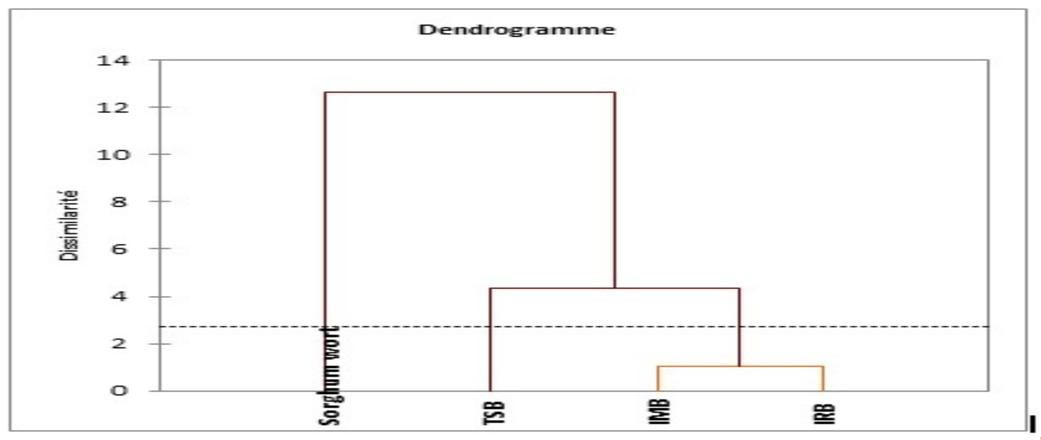
	DPPH (% Antiradical activity)	FRAP (µg/mL Ascorbic acid)
Sorghum wort	73.33±1.15 a	96±6 a
 TSB	59.62±2.69 b	119.99±8.01 b
 IMB	39.19±1.02 c	103.51±0.62 ab
 IRB	57.57±0.62 b	109.46±0.39 b

Values are means ±standard deviation, n= 3. Means in the same column with different letters are significantly different according to Tukey's test ($p < 0.05$). TSB : traditional sorghum beer ; IMB : Industrial maize beer ; IRB : Industrial rice beer

Table 3 : Diet fibers and antimalarial compounds contents.

	Sorghum wort	 TSB	 IMB	 IRB
Diets fibers (g/100 mL)	0.565±0.049a	0.245±0.007a	nd	nd
Quinine formate	nd	nd	nd	nd
Quinine dihydrochloride	nd	nd	nd	nd
Chloroquine	nd	nd	nd	nd

Values are means ±standard deviation, n= 3. Means in the same column with different letters are significantly different according to Tukey's test ($p < 0.05$). TSB : traditional sorghum beer ; IMB : Industrial maize beer ; IRB : Industrial rice beer



4-Conclusion

The traditional sorghum beer showed good antioxidant activities and the high phenolic compounds content than industrials beers. None antimalarial compounds have been found and the diets fibers concentrations were relatively lowest. Undoubtedly the therapeutic qualities attributed to traditional sorghum beer were due to phenolic compounds. Also, a study *in vivo* with animal model will most appropriate.