

## **Vitellaria paradoxa nuts, a pharmacological bioresource : antioxydant efficacy of its derivative products**

### **Abstract**

Vitellaria paradoxa is an useful african tree. Its nuts are mainly exploited for their fat or butter. The present study was carried out in order to demonstrate the pharmacological virtues of shea nuts derivative products through their phytochemical components and their antioxydant efficacy. Therefore, their hydroalcoholic extracts were qualitatively screened in order to detect phytochemical components, and their antioxidant efficacy was tested through their ability to reducing DPPH. Results revealed that the whole shea nuts derivative products tested positive to phenolic compounds, flavonoids, tannins, terpenoids, triterpenic alcohols and to sterols ; most of these compounds are known as active principles. DPPH test also proved that the whole shea nuts derivative products have antioxidant power. This power varied increasing (5.37%, 58.56% and 62.99%) from butter to hulls and press cake. Based on these results, shea nuts could constitute a value-added resource of bioactive principle, which might be taken into account in the prevention of diseases linked to oxidative stress, such as tumors, cancer and other degenerative diseases.

**Keywords** : Vitellaria paradoxa nuts, pharmaceutical virtues, phytochemical compounds, antioxidant efficacy, oxidative stress

### **Introduction**

Vitellaria paradoxa nut is an oleaginous seed which fat or butter is widely exploited for food and non-food purposes, mainly due to its physicochemical properties<sup>1-3</sup>. Its hulls and press cake are considered as waste and not efficiently exploited as those of other oleaginous seeds do. Indeed, shea hulls are either burned or used as fuel and fertiliser. Press cakes as for them are given to cattle or used as salant in houses<sup>4,5</sup>. Parallely, hulls of many seeds serve in food industry as supplements and vitamins and aminiacids providers<sup>6</sup>. They are also incorporated in cosmetics either entirely or their extract. These special uses are mostly linked to their contents in active compounds which would confer pharmacological virtues<sup>7</sup>. But, what about shea nuts hulls and press cakes ? Have-they any pharmacological interest ? Hence, this study was carry out in order to demonstrate the pharmacological virtues of shea nuts derivative products (butter, hull and press cake) through their antioxydant efficacy. The study might be considered as a contribution to the prevention/fight against diseases due to oxidative stress like tumor and cancer, and also to the search for non-conventional source of bioactive compounds.

### **Material and methods**

#### **Material**

For the study, dried shea nuts were kindly provided by the laboratory of the Pedagogy and Research United of Biotechnology located in University Felix Houphourt-Boigny (Côte d'Ivoire). These nuts would be sun dried for five days, according to Megnanou et al.<sup>8</sup> process.

#### **Methods**

##### **Phytochemical qualitative screening of shea nuts derivative products**

Qualitative screening methods described by Edeoga et al.<sup>9</sup>, Paris & Moyses<sup>10</sup> and Evans<sup>11</sup> were used to check the presence of phenolic compound, flavonoids, tannins, terpenoids, triterpenic alcohols and stérols, un shea nuts derivative products. Hence, hydromethanolic extracts of shea butter, hulls and press cakes were prepared following Singleton et al.<sup>12</sup> method. A few amount of the resulting extracts was used for each qualitative test.

##### **DPPH assay for shea nuts derivative products antioxydant efficacy.**

The DPPH assay was conducted following Benhammou et al.<sup>13</sup>. The DPPH solution (6 mg in 100 mL methanol) was prepared by dissolving the DPPH radical in methanol at 70% (v/v). A 50 µL aliquot of methanol extract was pipetted in a tube to hemolyse and 1950 µl of DPPH solution then added. The mixture was incubated in darkness at room temperature for 30 min. The absorbance was read at 517 nm in a spectrophotometer (Pioway, China).

## Results and discussion

### Phytochemical compounds of shea nuts derivative products

Qualitative screening of phytochemical compounds revealed that the whole shea nuts derivative products tested positive to phenolic compounds, flavonoids, tannins, terpenoids, triterpenic alcohols and to sterols (Table 1).

**Table 1 : Phenolic compounds**

	Polyphenols	Flavonoids	Tannins	Saponin	Sterols	Triterpenic alcohols
<b>SK</b>	+	+	+	+	+	+
<b>SB</b>	+	+	+	+	+	+
<b>SH</b>	+	+	+	+	+	+
<b>SPC</b>	+	+	+	+	+	+

SK : Shea kernel ; SB : Shea butter ; SH : shea hull ; SPC : shea press-cake

(+) : Detected

These results mean that shea kernels, hulls, butter and press-cake contain valuable phytochemical compounds which are researched and widely exploited for pharmacological and cosmetical purposes. Indeed, terpenoids would be widely exploited in cosmetical industries under their identity of unsaponifiable fraction<sup>14</sup> for their properties of antiaging, repairing, moisturizing, etc.<sup>15</sup>. About unsaponifiable, anterior study has reported optimized shea butter important content Megnanou et al.<sup>8</sup>. As for phenolic compounds which are constituted by flavonoids and tannins chemical groups, they would confer antioxydant<sup>6,16</sup>, antidiabetic<sup>17,18</sup>, etc. virtues to their matrix ; they would be bioactive compounds like terpenoids. Matrix here, consisted in kernels, hulls, butter and press cakes ; the whole resulting from shea nuts. Hence shea nuts which is mostly exploited just for its fat, could now constitute a value-added resource of bioactive principle. A proof of this bioactivity was the antioxidant efficacy of its derivative products.

### Antioxidant efficacy of shea butter, hulls and press cakes

Results of the antioxidant essay proved that all the derivative products of shea nuts (butter, hulls and press cakes) reduced significantly DPPH which constituted in this study, the free-radical to be scavenged. DPPH reducing powers varied ( $5.37 \pm 0.89$  %,  $58.56 \pm 0.24$  % and  $62.99 \pm 0.56$  %, for butter, hulls and press cakes, respectively) significantly from a matrix to another (Table 2).

**Table 2 : DPPH reducing power of shea nuts derivative products**

	Shea butter (0.2mg/mL)	Shea nuts hulls (10mg/mL)	Shea press cakes (10mg/mL)
<b>DPPH reducing power (%)</b>	$5.37 \pm 0.89$	$58.56 \pm 0.24$	$62.99 \pm 0.56$

However, it is to retain that shea nut could constitute a powerful antioxidant matrix which can be either consumed directly like cola nut, cocoa, curcuma, etc., or be incorporated to food, drugs or cosmetics, as supplement. Indeed, with the present prevalence of metabolic diseases and those due to oxidative stress, shea nuts, with its derivative products, appears as a solution to the research for non-conventional source of antioxidants.

## Conclusion

Shea nuts which are mainly traded and exploited for their fats, revealed through the present study, their ability as valuable sources of bioactive compounds such as phenolic compounds, flavonoids, tannins, terpenoids, triterpenic alcohols and sterols. Moreover, all of the derivative products (butter, hulls and press cakes) proved antioxidant efficiency.

Shea nuts constitute a value-added resource of bioactive principle, and could be taken into account in the prevention of diseases linked to oxidative stress, such as tumors, cancer and other degenerative diseases.

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### **Conflict of interest**

No conflict of interest associated with this work.

### **Authors' Contributions**

This work was carried out in collaboration among all authors. Authors RM and ABK designed the study, wrote the protocol. Authors ABK, and AESD anchored the field study, gathered the initial data and performed preliminary data analysis. While authors ABK, and RM managed the literature searches, interpreted the data and produced the initial draft. All authors read and approved the final manuscript.

### **Human or Animal Context**

This article does not contain any studies with human or animal subjects.

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