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EFFECT OF BLACK PEPPER AND TURMERIC FORTIFICATION ON THE ANTIOXIDANT, NUTRITIONAL, AND ORGANOLEPTIC CHARACTERISTICS OF A NATURAL CITRUS-GINGER JUICE BLEND

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Abstract:

A growing trend in the consumption of functional natural juices has been observed in recent years, stimulated by heightened public interest in promoting a healthy lifestyle and preventing chronic diseases. Juice derived from ginger, lemon, and orange falls within this category, offering a valuable contribution of bioactive compounds, vitamins, and minerals recognized for their protective physiological role. Within this work, an innovative natural juice (NJ) was formulated using oranges, lemons, ginger, turmeric, and black pepper. This product was analyzed comparatively with the raw materials and a control juice (M) (orange, lemon, and ginger only) for its ascorbic acid content, total polyphenols, and DPPH free radical scavenging activity. Additionally, both juice formulations were assessed for their proximate composition, nutritional value, and sensory attributes. Among the raw materials, lemon pulp had the highest Vitamin C content, followed by oranges and ginger, while turmeric and black pepper registered insignificant concentrations of ascorbic acid. Consequently, the SN juice exhibited a lower Vitamin C concentration than the control juice. Regarding Total Polyphenol Content (TPC) and Radical Scavenging Activity (RSA), the maximal values were quantified in the turmeric powder, followed by ginger and black pepper. Consequently, the NJ juice registered significantly higher values for these parameters compared to the control (M). Nutritionally, the fortification of the orange, lemon, and ginger juice with turmeric and black pepper led to elevated concentrations of protein, total carbohydrates, and dietary fiber, along with an increased energy value. The sensory analysis revealed that NJ achieved superior scores across all evaluated organoleptic attributes compared to the control (M), despite the fact that the control product also secured notably high ratings.

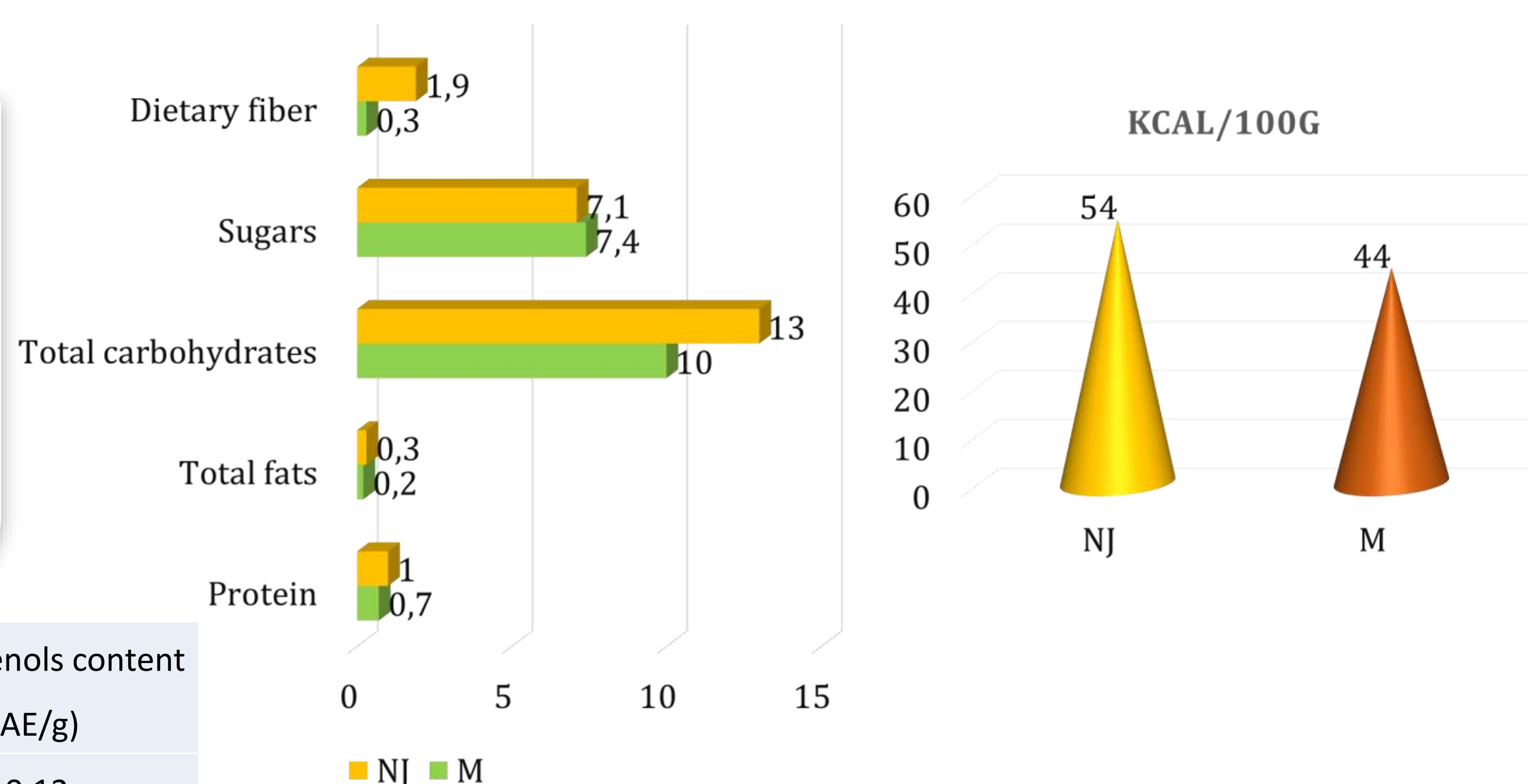
• Results and discussions

Sample	C Vitamin (mg/100g)
Orange pulp	69.28±1.02
Lemon pulp	77.81±0.88
Ginger root	5.26±0.06
Turmeric	0.58±0.02
Black pepper	0.25±0.01
NJ	64.17±0.78
M	66.48±0.82

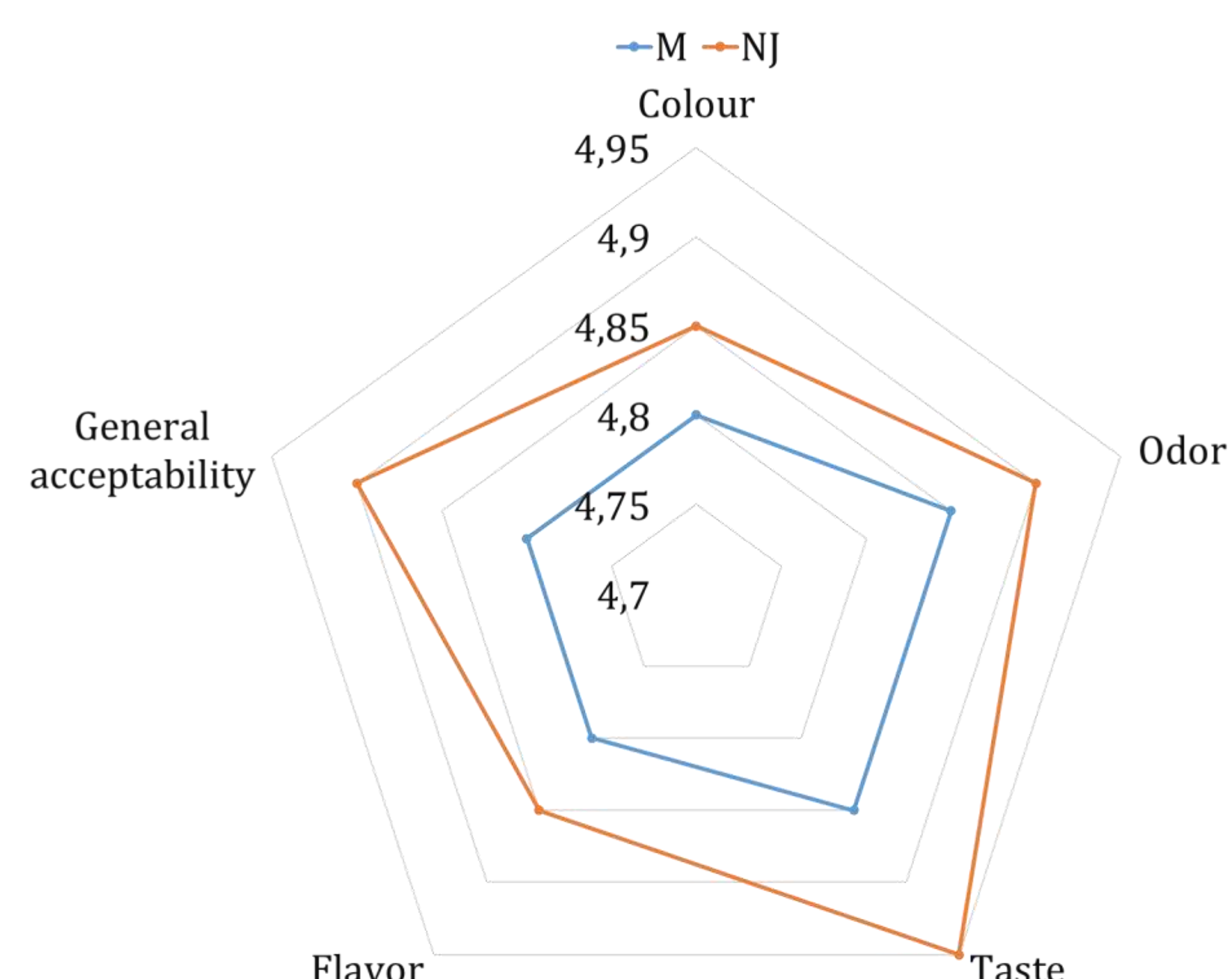
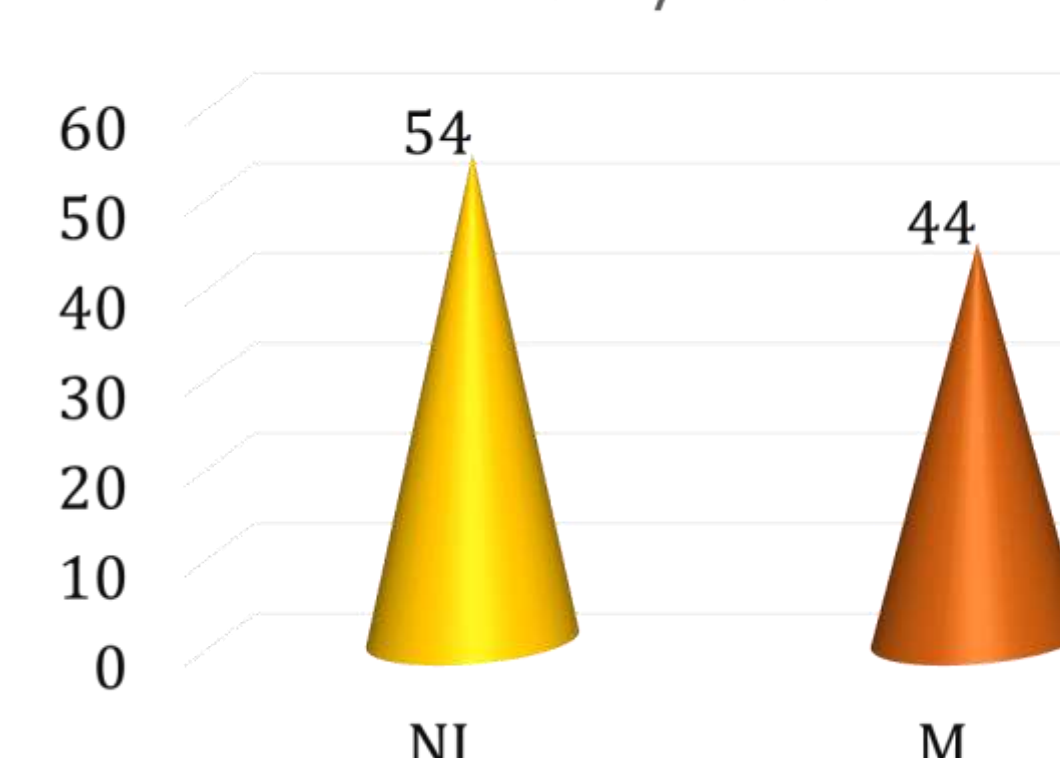


Sample	RSA (%)
Orange pulp	84.56±0.44
Lemon pulp	86.91±0.36
Ginger root	93.84±0.42
Turmeric	94.46±0.48
Black pepper	92.28±0.40
NJ	91.85±0.34
M	85.46±0.31

Sample	Total polyphenols content (mg GAE/g)
Orange pulp	5.07±0.12
Lemon pulp	3.25±0.08
Ginger root	8.49±0.24
Turmeric	30.42±0.36
Black pepper	7.02±0.14
NJ	5.73±0.10
M	4.97±0.06



KCAL/100G



• Conclusions

Due to the higher content of vitamin C and total polyphenols, the more potent antioxidant activity, the higher nutritional value, as well as the superior sensory characteristics, the addition of turmeric and black pepper is recommended for obtaining an orange, lemon, and ginger juice with superior antioxidant, sensory, and nutritional characteristics.