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Antioxidant activity and extraction kinetics of polyphenols in BOPF grade black tea (*Camellia sinensis*) from different geographical elevations in Sri Lanka

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Tea processed from young leaves and buds of *Camellia sinensis* is one of the most widely consumed beverages in the world due to its beneficial health effects. Tea grown in Sri Lanka are categorized as high grown (HGT), mid grown (MGT) and low grown tea (LGT) based on the geographical elevation of tea cultivation regions.

Optimization of brewing time is vital to get health benefits of tea. The present study was carried out to determine the extraction kinetics of total phenolic content and antioxidant activity in BOPF grade tea brewed in the traditional method as limited studies have been reported on the above parameters for BOPF tea manufactured in Sri Lanka.

Boiling water (250 mL) was added to tea leaves (5.0 g) and the mixture was stirred over the extraction period. Total phenols (TPC), flavonoids (TFC) and antioxidant activity was deduced for samples (2.0 mL) of tea extracts obtained at different time intervals. TPC and TFC were

determined using Folin Ciocalteu method and aluminium chloride method respectively. DPPH• radical scavenging and Ferric Reducing Antioxidant Power (FRAP) assay were used to determine the antioxidant activity.

Both TPC and TFC contents were highest in HGT followed by LGT and MGT. The highest values for TPC (%w/w GAE) were 12.39 ± 0.48 (at 360 s), 11.93 ± 0.24 (at 480 s) and 9.24 ± 0.42 (at 720 s), and TFC (% w/w QE) were 6.46 ± 0.46 (at 360 s), 6.35 ± 0.28 (at 720 s) and 6.19 ± 0.38 (at 720 s) for HGT, LGT and MGT respectively. Positive correlation was observed for antioxidant activity with the phytochemicals for all samples analyzed. Extraction kinetics of the antioxidants indicated that the extraction of polyphenols and flavonoids obeyed second order kinetics and extraction of polyphenols was rapid in LGT compares to the other two types.

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## Glycaemic index of vitagen: a commercial proforma formulated meal replacement

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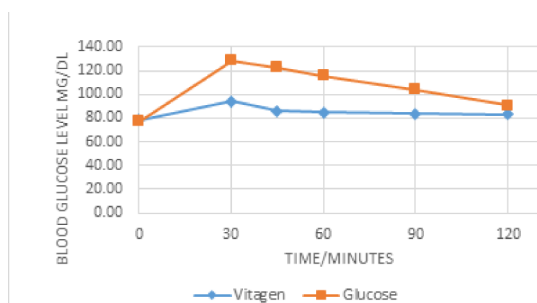
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Based on the glycaemic index (GI) food can be categorized according to their blood glucose response. At present, GI values are assigned to more than 750 food items available in the international market. However, though there are GI data of some basic Sri Lankan foods and traditional foods, sufficient data of commercial food products are not much investigated. Thus, the present study was carried out to determine the chemical composition and GI of proforma formulated meal replacement (Vitagen)

available in the Sri Lankan market.

Chemical composition of Vitagen was tested using standard AOAC methods. FAO/WHO guidelines were used to test the glycaemic responses where glucose was used as the standard. Healthy normal volunteers (n=10, 5 males and 5 females, 20-30 years) who were not under any medical treatment and with BMI range of 18.5-23 kg/m<sup>2</sup> participated for the study.



**Figure 1:** Blood glucose response to Vitagen and glucose

Vitagen contained  $61.12 \pm 0.67\%$  of carbohydrates,  $24.79 \pm 0.58\%$  of proteins,  $4.39 \pm 0.71\%$  of fat,  $3.09 \pm 0.04\%$  of moisture and  $7.59 \pm 0.05\%$  of ash. Mean glycaemic index was 22 and categorized as a low GI product (Figure 1). The mean glycaemic load was 11, thus a medium glycaemic load is provided per portion. Peak time was achieved in 30 minutes and the peak reduction was 26%. Therefore, consumption of Vitagen in the recommended

quantity as a food supplement can be recommended for individuals seeking to control blood glucose levels or reduce caloric intake.

#### Acknowledgement

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Technical Sessions : A - 17

Phenolic compounds and antioxidant activity of *Ampelocissus indica* (L.) planch; a wild grape species native to Asia

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Grape is a natural source of phenolic compounds, that contributes to the sensory characteristics and many beneficial bioactivities, mainly antioxidant activity of wines and other processed food products. Antioxidant activity and phenolic distribution of European grape species have been thoroughly investigated due to their popularity as a consumer product and availability all over the world. However, less amount of research has been done for Asian grape species. Hence, in the present study, we analyzed the phenolic content and antioxidant activity of *Ampelocissus indica* (L.) planch, a wild grape species native to Asia. Ripe wild grape berries were collected from Kanneliya rain forest in Sri Lanka. Seed and skin were separated from the berry and skin/seed was extracted using 80% methanol. Phytochemical screening and qualitative HPLC analysis were carried out to identify phenolic groups/compounds present in grape berry. Additionally, two phenolic compound parameters namely total phenolic content and total proanthocyanidin content, and one antioxidant parameter namely DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging

activity were measured, for the extracts. Phytochemical tests indicated that flavanoids, proanthocyanidins, tannis and polyphenols are present in grape berry. Further, HPLC analysis confirmed the presence of gallic acid and catechin in wild grape fruit. Total phenolic content of wild grape seed expressed as gallic acid equivalents (GAE) was estimated as $56.69 \pm 0.23 \text{ mg g}^{-1}$ while that was $23.32 \pm 0.13 \text{ mg g}^{-1}$ for the wild grape skin for the fresh weight of sample. Total proanthocyanidin content expressed as catechin equivalents (CE) of wild grape seed and skin were estimated as $36.81 \pm 0.17 \text{ mg g}^{-1}$ and $14.68 \pm 0.21 \text{ mg g}^{-1}$, respectively for fresh weight of sample. The DPPH radical scavenging assay expressed as IC_{50} in mg ml^{-1} of wild grape skin and seed were $0.34 \pm 0.002 \text{ mg ml}^{-1}$ and $0.29 \pm 0.001 \text{ mg ml}^{-1}$, respectively. The results revealed that the wild grapes native to Asia contain a higher amount of total phenolic and total proanthocyanidin content compared to that of European grape *Vitis vinifera* spp. The antioxidant activity of wild grape is comparable with ascorbic acid as well as European grapes. This study demonstrates that the wild