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Short communication

PEAK EXPIRATORY FLOW RATE (PEFR) IN YOUNG ADULT NIGERIANS FOLLOWING INGESTION OF *GARCINIA KOLA* (HECKEL) SEEDS.

[1]EBOMOYI, M.I.E and IYAWE, V.I.

Department of Physiology, Faculty of Medicine
University of Benin, Benin City. Nigeria.

PEFR was measured in 82 male students following the ingestion of 15gm of Garcinia Kola. Overall, PEFR increased with age, height, weight and chest circumference. The lowest control PEFR was 450 L/min and the highest control PEFR was 647 L/min. Following the ingestion of Garcinia Kola, PEFR decreased to 445 L/min and 615 L/min respectively at the end of 90 mins. Mean control PEFR was 576.17 ± 20 and mean PEFR 90min after Garcinia Kola consumption was 542 ± 26 (P < 0.05). Garcinia Kola may clear the airway, but does not improve the airflow in young adults.

KEY WORDS: *PEFR, Garcinia Kola.*

In spite of ready availability of various orthodox drugs for the treatment of respiratory tract diseases in Nigeria, there is an upsurge in the search for herbal remedies by a cross section of both literate and illiterate populations. *Garcinia kola* (Heckel) seeds popularly known as 'bitter kola' and (hereafter referred to as Gk) form an integral part of the herbal preparation used in traditional African medicine practice for the treatment of various respiratory tract diseases, including asthma, and to 'clear' the airways. Gk has been shown to inhibit smooth muscle activity. It relaxes the smooth muscles of the uterus and the intestine (Braide, 1989). Although Gk lacks caffeine (Osisiogu, 1964), its alkaloid and biflavonoid fractions are said to relax the smooth muscles [Braide, 1989].

Decreased bronchomotor tone would lead to a fall in airway resistance and hence increased flow rate of air along it. Tests of Peak Expiratory Flow Rate (PEFR) reflect changes in airway calibres [Hughes and Empey, 1981]. The portability of the peak flow meter and the simplicity of the PEFR test make it particularly suitable for epidemiological studies of respiratory function as in this study. It is hypothesized that Gk would cause bronchodilation since it has been shown to relax the gastrointestinal tract and uterus. This present work investigates the therapeutic value of Gk ingestion, using PEFR as an index of change.

MATERIALS AND METHODS

Subjects for the study comprised 82 male medical students (age range 18 - 30) of the University of Benin, Nigeria. Height ranged from 157 - 189cm, weight from 46 - 80kg and chest circumference from 70 - 104cm. Majority of the subjects were of age 20 years (21 subjects), 21 years (12 subjects) and 22 years (18 subjects). The study was approved by the Ethical Committee of the Faculty of Medicine.

The following criteria were satisfied by each of the students before being accepted as a subject for the study: (a) No history of cardio - pulmonary disease. (b) Availability and capacity to cooperate adequately during the duration of the study. (c) Garcinia kola seeds used were commercial samples obtained locally from a dealer who got them from the same source. The identity of the plant was confirmed by the Botany department, University of Benin. The ages of the subject were recorded. Weights were measured with a bathroom scale (HANA BR - 9011). Heights were measured with a standard stadiometer, and chest circumference with a tape rule. PEFR was measured with a Wright's peak flow meter (W 27871) which had been calibrated.

All tests were performed with the subjects comfortably seated. 3 PEFR maneouvres were made by each subject, and the highest value was recorded, since this parameter requires maximum effort. The control record was taken, and the subject was given 15g (approximately 2 seeds) of Gk to eat. PEFR records were taken immediately after Gk ingestion, and at intervals of 15, 30, 45, 60 and 90 minutes following Gk ingestion.

At the end of all measurements, subjects were grouped according to age, heights, weight, and chest circumference. The mean PEFR before and after the ingestion of Gk was tabulated for the subject according to age.

[1]*Author for Correspondence*

Results were expressed as mean PEFR ± standard deviation (mean ± SD), while the students' t - test was used to determine the difference between the means. P - values less than 0.05 ($P < 0.05$) were taken as statistically significant.

RESULTS

In general PEFR increased with height, chest circumference and weight. PEFR for subjects in the height range 157-159cm was 470 L/min and it increased to 608 L/min for subjects in the height range 187-189cm. For chest circumference 70-74cm, PEFR was 540 L/min and for chest circumference 100-104cm, PEFR was 590 L/min. The variation with weight showed a PEFR of 520 L/min for those with weight 46-50kg and 612 L/min for those with 76-80kg.

PEFR also increased with age (table 1). Control PEFR was highest in age 28 years with 647 L/min. It decreased immediately after Gk ingestion to 600 L/min and 615 L/min after 90 min. The lowest control PEFR was 450 L/min and this decreased to 435 L/min immediately after Gk ingestion and 445 L/min after 90 min. Mean control PEFR for all subjects was 576.17 ± 24 and Mean PEFR for all subjects 90 min after Gk ingestion was 542.32 ± 26 ($P < 0.05$).

Table 1.
Variations of PEFR with Age, before and at intervals after GK ingestion.

AGE (Yrs.)	NO OF SUBJ.	PEFR (Mean ± SD) L/min						
		CONTROL	0min	15mins	30mins	45mins	60mins	90mins
18	7	607.86 ±49.70	620.0 ± 62.51	594.0 ±51.54	579.0 ±50.08	586.25 ±38.45	597.50 ±50.21	581.0 ±54.26
19	1	450.0	435.0	445.0	440.0	445.0	445.0	445.0
20	21	561.91 ±49.04	558.33 ±43.43	557.06 ±45.35	557.86 ±44.82	567.33 ±40.23	559.64 ±41.80	552.31 ±40.14
21	12	575.0 ±59.83	575.46 ±63.55	565.0 ±59.94	566.88 ±54.44	552.50 ±50.68	551.88 ±45.50	544.29 ±48.99
22	18	576.39 ±45.24	573.61 ±42.12	572.50 ±40.86	568.21 ±41.50	570.77 ±40.62	565.0 ±39.67	565.0 ±39.67
23	3	530.0 ±45.46	525.0 ±42.62	562.50 ±65.75	550.0 ±58.52	535.0 ±67.02	527.50 ±47.15	535.0 ±49.50
24	4	590.0 ±31.02	560.0 ±36.40	593.33 ±27.48	590.0 ±23.18	595.0 ±28.94	598.33 ±35.78	601.67 ±46.69
25	2	552.50 ±47.50	562.50 ±27.50	562.50 ±27.50	570.0 ±30.0	567.50 ±32.50	567.50 ±47.50	560.0 ±45.0
26	9	582.22 ±74.50	588.33 ±63.73	575.0 ±58.74	575.0 ±64.83	575.71 ±60.84	573.57 ±62.35	580.0 ±63.97
27	1	540.0	495.0	480.0	485.0	480.0	460.0	440.0
28	2	647.50 ±47.50	600.0 ±5.0	630.0 ±35.0	622.5 ±32.5	630.0 ±50.0	615.0 ±35.0	615.0 ±30.0
30	2	632.50 ±2.50	625.0 ±30.0	612.50 ±77.50	617.50 ±77.50	620.0 ±80.0	617.50 ±77.50	615.0 ±85.0

DISCUSSION

In recent times, scientific studies have been carried out on the herbal substances used in traditional medicine practice in Africa, in an attempt to validate the efficacy of such substances. The studies have been on the biological activities, pharmacology and toxicology of extracts from the plants, isolation and chemical characterisation of the active ingredients, and to a limited extent, formulation of the substances as medicines.

There have been conflicting reports on the effects of Gk on smooth muscle. The report of Braide (1989) showed that the alkaloid and biflavonoid fractions of Gk inhibit smooth muscle activity. He demonstrated this on isolated smooth muscle preparations from the uterus and G.I.T. Similar plant flavonoids and biflavonoids were reported by earlier workers to exhibit spasmolytic effects [Cody et al, 1986]. Scientific studies have not been carried out on the effect of extracts of Gk on the respiratory smooth muscle, despite its wide application in the treatment of respiratory tract diseases in traditional medicine practice. Also epidemiological studies on the effect of Gk on the reactivity of the respiratory tract following oral ingestion (as it is normally consumed by its users) is lacking. This observation prompted the present study.

The simplicity of the Peak flow test makes it particularly suitable for epidemiological studies. However in an epidemiological survey such as this, the Peak flow test only gives information on the

variations of PEFR, but does not give concise information on the time course or bronchodilator effect of Gk. Isolated smooth muscle preparations of the airway are needed in order to get more precise information on the response of airway smooth muscle and consequently the therapeutic value of Gk in the management of respiratory tract diseases.

It is well established that sex, age, and height are the main factors affecting FEV1, FVC, and PEFR (Cotes, 1993). To eliminate the effect of sex, the present study was done in male young adults only. The study confirms that even among young adults (ages 18 - 30 years) of the same sex, living within the same socio-cultural environment, and engaged in the same form of physical activities, PEFR increases with age, height, weight and chest circumference (Femi-Pearse et al, 1971, Onadeko et al, 1976 and Alakija et al, 1990). However, PEFR decreased following the ingestion of Gk contrary to the perceived benefit by its users. Thus, while Gk may be useful in airway clearance, it may actually cause broncho-constriction and consequently a fall in PEFR. The fall in PEFR may also be due to a progressive decrease in muscle strength with repeated peak flow measurement. Nonetheless, our inability to do a dose response curve for Gk and also determine its 1/2 - life are some of the drawbacks in this study. Studies on isolated airway smooth muscle may help to ascertain its reactivity to Gk.

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