A Study Of Correlation Between Derived And Basic Anthropometric Indices In Type 2 Diabetes Mellitus

L Olayaki, S Gesua, O Jimoh, M Ajao, A Olawepo, M Ighodalo

Citation

L Olayaki, S Gesua, O Jimoh, M Ajao, A Olawepo, M Ighodalo. *A Study Of Correlation Between Derived And Basic Anthropometric Indices In Type 2 Diabetes Mellitus*. The Internet Journal of Endocrinology. 2008 Volume 5 Number 2.

Abstract

Introduction: Obesity and diabetes are related disease with genetics, environmental and dietary factors implicated in there genesis. Basic anthropometric measeurements are use as indicators for the presence of these diseases. Derived measurements from these basic measures are being use more frequently with some of the basic ones at the verge of been discarded as assessment in clinical practice. The study assesses the correlations between the basic and the derived measurement in Type 2 Diabetic subjects.Materials and Method: Diabetic patients were recruited from the investigative clinic of the hospital for this cross-sectional study. The basic anthropometric measurement of height, weight, hip circumference, waist circumference and the derived measures BMI, WHR, WHtR were determined from this basic measures.Results: Correlations between the derived and basic measures were determined using SPSS statistical software was use. There was a significant correlation between WC and HC and the derived variables BMI, WHR and WHtR among the nonobese DM compared to the obese DM. HC has a poor correlation with the the derived variables among the obese DM.Conclusion: The HC assessment in nonobese DM patients is more relevant than in the obese DM patients.

INTRODUCTION

The World Health Organisation (WHO) estimates that 4 billion people, i.e. 80% of the world population, use herbal medicine for some aspect of primary health care (Farnsworth et al., 1985). Many herbs either wholly or their extracts are consumed by pregnant women effects of which are not known on the mother and the children. Ocimum gratissimum (Linn) is one of the herbs commonly consume by pregnant women in Nigeria. O. gratissimum of the family Labiaceae is native to the tropical and warm temperate region of the old world. O.gratissimum is one of the species from the genus. It is commonly called African basil or shrubby basil. It is Efinrin in Yoruba, Aai doya ta gida in Hausa and Nchonwu in Igbo (Owulade, 2004). In Nigeria, the plant is used in the treatment of miscarriage (Ogbe et al., 2009), diarrhoea (Sofowora, 1993), and high fever (Oliver, 1960). It has also been reported to have antibacterial (Nakamura et al., 1999) and antihelmintic (Pessoa et al., 2002) activities. This is however, without information on its effect on progesterone and fetal outcome during pregnancy. This study was therefore designed to provide information on the effect of aqueous extract of O. gratissimum leaves on progesterone and fetal outcome during pregnancy. Several studies have shown that plant extracts could alter the concentrations and functions of female reproductive hormones (Telefo et al., 1998 and Benie et al., 2003).

MATERIALS AND METHODS

PREPARATION OF EXTRACT

O. gratissimum leaves were purchased from a local herb store at Ijora, Lagos, Nigeria. The leaves were at the Pharmacognosy Department of the College of Medicine, and Department of Botany and Microbiology, University of Lagos, using a herbarium specimen. The leaves were washed and air-dried. The aqueous extract of O. gratissimum leaf was prepared using the method described by Farida et al., 1987, then filtered and the residue was discarded. The filtrate was subsequently evaporated to dryness. The resulting powder of the extract was stored in capped bottles until needed. The extract of O. gratissimum (5g) was dissolved in 1000ml distilled water to make a stock of 5mg/ml.

TREATMENT OF RATS

Twenty one albino rats (Rattus norvegicus, Muridae) weighing between 150 to 200g and obtained from Animal Breeding Unit, College of Medicine, University of Lagos, were used for this study.

All animals were housed in plastic cage with stainless still steel mesh cover under standard laboratory conditions (light period 6.30am to 7.00pm), temperature 27±20C, relative humidity 55%, with food and water freely available. They received humane care.

The rats were divided into three groups of Control, 100mg/kg O. gratissimum-treated and 200mg/kg O. gratissimum treated.

Female and male rats were caged together during the night. The morning that conception was verified by the presence of sperm in a vaginal smear was designated gestational day 0.

The O. gratissimum groups were fed with 100mg/kg and 200mg/kg aqueous extract of O. gratissimum respectively from gestation day 2 to gestation day 19 when the animals were sacrificed.

On the 19th day, the animals were sacrificed by means of cervical displacement. Blood was taken and the uteri removed allowing for examination of the foetuses. The number of resorptions, weight of foetuses, size and external morphological examination were recorded (Beck, 1989).

EXTERNAL EXAMINATION OF THE FOETUSES

With the help of a magnifying glass, the presence or absence of cleft palate was observed, as well as the position of eye and ear implantations, the tail (form and length). The extremities were examined for abnormalities such as polydactyl and syndactyl.

PROGESTERONE ASSAY

Immediately after the rats were sacrificed, blood was collected from the heart by syringe and transferred to plain tube. Samples were then centrifuged at 40C and serum from each rat was stored at -200C. Serum progesterone concentration was determined by enzyme immunoassay technique (Progesterone Enzyme Immunoassay Test Kit, Catalog No. 2077Z, Diagnostic Automation Inc., Calabasas, CA, U.S.A.).

STATISTICAL ANALYSIS

Data were expressed as mean±SEM. Statistical significance was determined using Student's t-test. P<0.05 was considered significant.

RESULTS

Effects of aqueous extract of O. gratissimum on litter size, litter weight, maternal weight gain and serum progesterone in rats were shown in Table 1.

O. gratissimum caused increased litter size from 6.7±1.6 in the control group to 9.2±0.7 (p<0.01) and 9.4±1.2 (p<0.003) in 100mg/kg and 200mg/kg O. gratissimum treated group respectively. There was no statistical significant difference in the litter size among the treated groups.

There was reduction in litter weight from 6.7±0.7g in the control group to 4.5±0.1g (p<0.0002) and 4.3±0.2g (p<0.0003) in the 100mg/kg and 200mg/kg treated groups respectively. There was no statistically significant difference in the litter weight among the treated groups.

Aqueous extract of O. gratissimum caused reduced maternal weight gain in the treated group compared to the control. Maternal weight gain reduced from 63.7±2.6g in the control to 56.0±1.4g (p<0.05) and 56.3±31.6g (p<0.05) in the 100mg/kg and 200mg/kg treated groups respectively. There was no statistically significant difference in the litter weight among the treated groups.

There was statistically significant increase in serum progesterone in O. gratissimum treated group compared to the control group. Serum progesterone increased from 101.4±4.8ng/ml in the control group to 109.3±2.7ng /ml (p<0.003) and 111.7±1.6ng/ml (p<0.002) in the 100mg/kg and 200mg/kg treated groups respectively.

Figure 1

Table 1. Effects of aqueous extract of on litter size, litter weight, maternal weight gain and serum progesterone in rats.

	Control	*O. gratissimum* 100mg/kg	*O. gratissimum* 200mg/kg
Litter Size	6.7 ± 1.6^{a}	9.2 ± 0.7^{b}	9.4 ± 1.2^{b}
Litter Weight (g)	6.7 ± 0.7^{a}	4.5 ± 0.1^{b}	4.3 ± 0.2^{b}
Maternal Weight Gain (g)	63.7 ± 2.6^{a}	56.0 ± 1.4^{b}	56.3 ± 1.6^{b}
Serum Progesterone (ng/ml)	101.4 ± 4.8^{a}	109.3 ± 2.7^{b}	111.7 ± 1.6^{b}

Values are expressed as mean ± SD. Number of rats in each group = 6.

^{abc} Different superscripts on means ± SD along the same row indicate $p < 0.05$.

DISCUSSION

The results of our study indicate that aqueous extract of O. gratissimum increased litter size and serum progesterone in rats and reduced litter weight and maternal weight gain during pregnancy.

Some of the constituents of O. gratissimum are alkaloids, saponins, tannins, phlobatannins, anthraquinones, steroids, terpenoids, flavonoids, and cardiac glycosides (Akinmoladun et al., 2007 and Edeoga et al., 2006). Studies by Yu et al., (2003) showed that saponin treatments lower serum androgens and 17-estradiol, but elevate progesterone

levels, suggesting that saponins modulates steriodogenesis in the ovary. The observed increase in plasma progesterone concentration could be due to stimulatory effects of O. grattisimum on progesterone production. But because of the anti- diarrhoeal effects of O. grattisimum (Sofowora, 1993), it could have other mechanisms of action.

Progesterone has an antiestrogenic effect on the myometrial cell, decreasing their excitability, their sensitivity to oxytocin, and their spontaneous electrical activity while increasing their membrane potential (Ganong, 2003). The increased litter size could be due to the ability of progesterone to reduce myometrial cells excitability, thereby increasing the number of implantation and subsequent number of life fetuses. The reduced litter weight could be due to increased number of fetuses, but because of the accompanied reduction in maternal weight there might be associated antinutrient agents in the O. grattisimum extract.

There is need for further study in order to isolate the active compound that is responsible for the increased progesterone and those that are responsible for the reduced maternal weight and fetal weight. In conclusion, oral administration of aqueous leaf extract of O. gratissimum could be effective in increasing implantation and prevent premature delivery.

References

1. Akinmoladun AC, Ibukun EO, Afor E, Obuotor EM, Farombi EO (2007). Phytochemical constituent and antioxidant activity of extract from the leaves of Ocimum gratissimum. Sci. Res. Essay. 2:63-166.
2. Benie T, Duval J, Thieulant ML. Effects of some traditional plant extracts on rat oestrous cycle compared with clomid. Phytother Res 2003; 17: 748-755.
3. Edeoga HO, Omosun G, Uche LC (2006). Chemical composition of Hyptis suaveolens and Ocimum gratissimum hybrids from Nigeria. Afr. J. Biotechnol. 5:892-895.
4. Farnsworth NR, Akerele O, Bingel AS, Soejarto DD, Guo ZG (1985). Medicinal plants in Therapy. Bulletin of WHO 63:965-998.
5. Ganong WF (2003). Review of Medical Physiology. 21st Edition, Lange Medical Publications, Connecticut, USA. 21st Edition, pp 447.
6. Nakamura C. V., Nakamura T. U., Bando E., Melo A. F. N., Cortez D. A. G., Dias Filho B. P. (1999) Antibacterial activity of Ocimum gratissimum L. essential oil. Mem. Inst. Oswaldo Cruz. 94: 675-678
7. Ogbe FMD, Eruogun OL, and Uwagboe M (2009). Plants used for female reproductive health care in Oredo local government area, Nigeria. Sci. Res. Essays 4(3):120-130.
8. Oliver, B. (1960) Medicinal plants in Nigeria. University of Ibadan, p358.
9. Owulade, M. O. (2004) Handbook African Medicinal Plants, CRC Press, Boca Raton, Florida, USA. Page 214-215.
10. Pessoa L. M., Morais S. M., Bevilaqua C. M. L., Luciano J. H. S. (2002) Anthelmintic activity of essential oil of Ocimum gratissimum Linn. and eugenol against Haemonchus contortus. Vet. Parasitol. 109: 59-63.
11. Sofowora, A. (1993). Medicinal Plants and Traditional Medicine. Spectrum Books Ltd. Ibadan, Nigeria. pp. 224 – 227.
12. Telefo PB, Moundipa PF, Tchana AN, Tchouanguep Dzickotze C, Mbiapo FT. Effects of an aqueous extract of Aloe buettneri, Justicia insularis, Hibiscus macranthus,Dicliptera verticillata on some physiological and biochemical parameters of reproduction in immature female rats. J Ethnopharmacol 1998; 63: 193-200.
13. Yu WJ, Lee BJ, Nam SY, Yang DC, and Yun YW, (2003). Modulating Effects of Korean Ginseng Saponins on Ovarian Function in Immature Rats. Biol. Pharm. Bull. 26(11):1574- 1580.

Author Information

L.A. Olayaki
Department of Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

S.S. Gesua
Department of Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

O.R. Jimoh
Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

M.S. Ajao
Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

A. Olawepo
Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria

M. Ighodalo
Department of Pharmacology and Therapeutics, Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin, Nigeria