INT. J. BIOL. BIOTECH., 8 (4); 575-578, 2011.

THE ALTERED PLASMA ELECTROLYTES CONCENTRATIONS INDUCED BY WEIGHT REDUCING HERBAL DRUG (MEHZILEEN) IN COMMON RABBITS

Ruqaiya Hasan, Mahmood Ahmad, Aisha Javaid and Zahir Hussain

Department of Physiology, University of Karachi, Karachi–75270, Pakistan.

ABSTRACT

The weight reducing herbal drug, Mehzileen, was administered orally to common rabbits *Oryctolagus cuniculus* in a daily dose of 30 mg for 27 days. Blood samples drawn from the animals on day 0, 3, 7, 10 and 27, were used to measure plasma electrolytes. The results showed significant ($p < 0.05$) elevation in mean concentrations of sodium and potassium. Calcium concentration initially showed a rise then declined after day 10 of drug administration. The major ingredients of the herbal drug used are tonic, laxatives and diuretic, severely affecting digestive system and kidneys, therefore, may result in electrolytes imbalance.

Key words: Herbal drugs, electrolytes, weight reduction, obesity, biochemical changes

INTRODUCTION

Obesity causes the accumulation of excess body fat to such an extent that it leads to health problems. The disorders mainly include diabetes type 2, heart disease, sleep disorders and cancer (Haslam and James, 2005). Current therapy and procedure for weight management includes: pharmacotherapy, physical activity, surgery, and dietary intervention. Behavioral modification is quite helpful as treatment (Klein *et al*., 2004). A variety of herbs are used now a days for the management of obesity. Herbal preparations and dietary supplements are generally employed in people with obese disorders (Shekelle *et al*., 2003; Pittler and Ernst, 2004; Feng *et al*., 2010; Bu *et al*., 2011) and weight loss is also manifest in people using herbal products (Boozer *et al*., 2001, 2002). The mechanism of such herbal medicines in reducing weight and their effects on general metabolism is not well understood at present. In the present investigation, an attempt has been made to evaluate the effects of commercially available slim claiming alternative medicine, Mehzileen (MZ), on the electrolytes of common rabbit and comparing the results with the data from the normal healthy control animals.

DRUG INFORMATION:

MEHZILEEN (MZ)

The herbal weight reducing drug MZ, available in tablet form, is a combination of different herbal extracts including; Ajwain (*Ptychotis ajowan*); Caraway (*Carum carvi*); Kalaunji (*Nigella sativa*); Penny royal ((*Mentha pulegium*); Rue (*Ruta graveolans*); Mugwort (*Artemisia vulgaris*) and Wormwood (*Artemisia absinthium*).The common medicinal effects of these herbs are through the involvement of digestive system and kidneys i.e. laxative, purgative, stimulant and diuretic (Greive,1971; Hasan *et al*., 2006).

MATERIALS AND METHODS

Animals

Ten rabbits (*Oryctolagus cuniculus*) used in this experiment were, 12 months old, ranging from 1500-1550 g, obtained from local supplier. They were kept in barred cages, placed in a ventilated environment and fed on normal diet for one month. Rabbits were divided into control and test groups.

Drug

The selected weight reducing herbal drug MEHZILEEN (Azeemi Laboratories, Karachi), was administered orally to each test animal with a daily dose of 30 mg for 27 days.

Blood sampling

Blood samples were drawn from the animals on day 0, 3, 7, 10 and 27 of drug administration by 3cc disposable syringes from the marginal vein of ears of each rabbit (Moreland, 1965). Heparinized blood samples were centrifuged at 2500 rpm for 5 minutes and plasma was transferred to eppendorf tubes to be stored at 4^{o} C.

Biochemical Analysis

Commercially available biochemical kits were used to measure the concentrations of plasma sodium, potassium and calcium. Absorbance was read on spectrophotometer. The data was analyzed statistically by t-test.

RESULTS

Sodium

The mean plasma sodium concentration in control rabbits was 145.8 ± 0.47 mmol / l on day 0, and slightly increased to 146.23 ± 0.64 mmol/ l on day 7. While test rabbits with mean sodium concentration of 147.11 ± 2.08 mmol/ l on day 0 showed a significant rise of 149.53 ± 1.83 mmol/ l on day 7 following the administration of herbal drug (MZ). All test rabbits showed a significant ($p<0.05$) elevation in the mean sodium concentration on day 10 and 27, after the administration of drug in comparison to control animals (Fig.1a).

Potassium

The mean concentration of potassium in plasma of control rabbits was 5.12 ± 0.16 mmol/ l, whereas test rabbits have 4.92 ± 0.23 mmol/ l on day 0, respectively. From day 0 to day 3 after the administration of herbal drug, test animals showed a gradual non significant ($p=0.0806$) rise in mean potassium concentration when compared with controls (Fig.1b). However from day 7 onwards a significant rise ($p<0.05$) in mean potassium concentration was observed, resulting in 13.60 ± 0.44 mmol/ l potassium in test animals.

Calcium

On day 0 the mean plasma calcium concentration in control and test rabbits was 2.16 ± 0.10 mmol/ l and 2.12 ±0.03 mmol/ l respectively. All test animals showed a gradual rise in calcium levels from day 3 to day 7, following the drug administration and reached a peak mean value of 2.76 ± 0.08 mmol/ l in tests on day 10 (Fig.1 c). While on day 27 test animals showed a reduction in calcium levels, which was 2.24 ± 0.06 mmol/ l whereas controls showed mean calcium level of 2.19 ± 0.16 mmol/ l .

DISCUSSION

Many weight reducing herbal drugs are effective due to their laxative and diuretic actions thus limiting the intestinal absorption and increasing the fluid loss (Stanko and Arch, 1996; Hasan *et al*., 2006), additionally there is a risk of serious electrolytes imbalance (Westendorf, 1993) and several medicinal plants have the potential to alter plasma levels of potassium resulting in either hypokalemia or hyperkalemia (Stewart *et al*., 1987) which is also evident by the present investigation, where significantly high concentrations of sodium, potassium and significant low levels of calcium in test animals are observed.

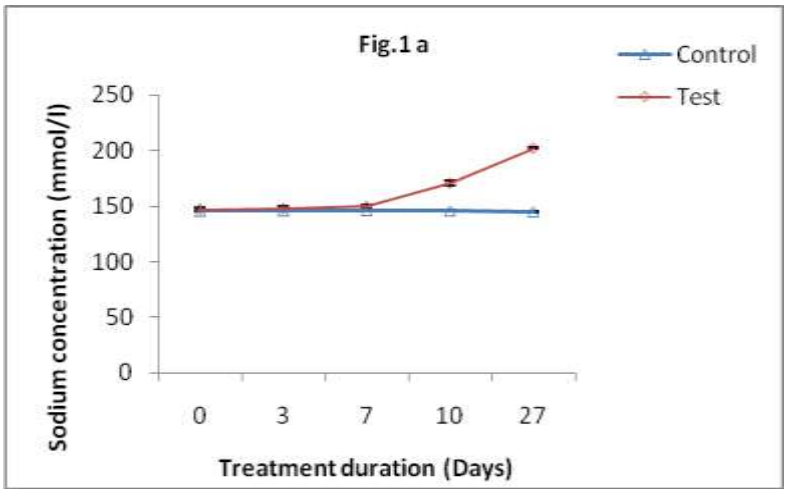
One of the constituents of MZ, *Carum carvi*, has been reported to decrease weight in diabetics because of its diuretic property (Sadiq *et al*., 2010) while significant elevated levels of sodium and potassium in urine with unaffected levels of both electrolytes in plasma were observed following the oral administration of *Carum carvi* in normal rats (Lahlou et al., 2007).

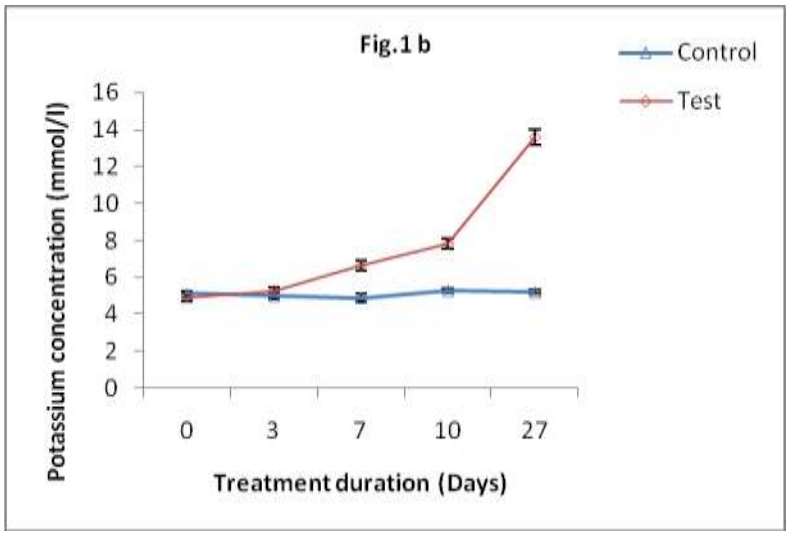
Nigella sativa, another constituent in MZ, is reported to influence BP, body weight, lipids and blood sugar levels (Qidwai *et al*., 2009). Meral and Kanter (2003) have reported the effects of *Nigella sativa* on electrolytes after observing the restoration of CCl4 induced high levels of serum potassium and calcium to normal levels in experimental rats.

It may be concluded that weight reduction by herbal drugs due to their laxative or diuretic actions on digestive system and kidneys may produce adverse effects resulting in diarrhea, dehydration, serious electrolytes imbalance followed by water retention and potassium deficiency (Berné *et al*., 2005) without a significant weight loss. There are little evidences that any of the available weight loss products would be effective, unless extra calories are utilized by regular exercise and healthy diet with low sodium and fats; rich in potassium, calcium and magnesium (Landsberg, 1999) as divalent cations show lipid-lowering effect by forming the insoluble and inabsorbable calcium and magnesium chelates with fatty acids (Vaskonen *et al*., 2001).

ACKNOWLEDGEMENT

We are grateful to The Dean, Faculty of Science, University of Karachi, to sanction the grant for this research.





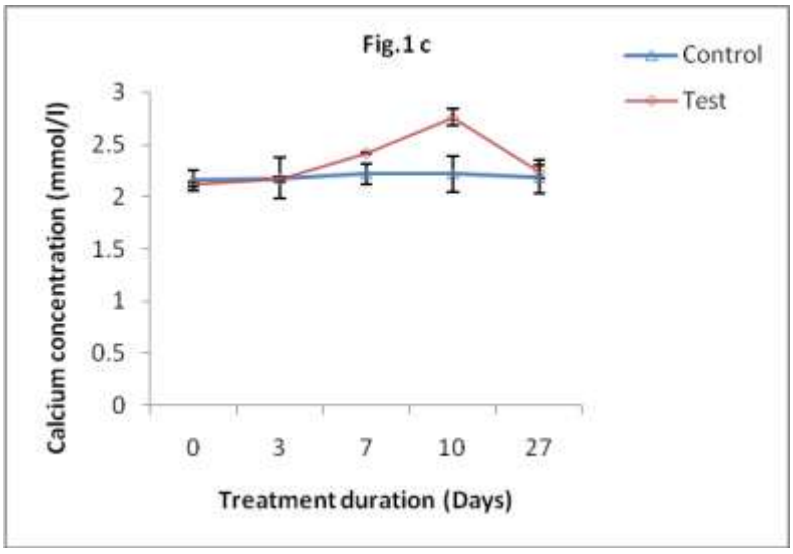


Fig.1. Comparison of mean plasma electrolytes concentrations in control and test rabbits.

REFERENCES

Berné, Y., D. Carias, A.M.Cioccia, E. González and P. Hevia (2005). Effect of the diuretic furosemide on urinary essential nutrient loss and on body stores in growing rats. *Arch. Latinoam Nutr*., 55(2): 154-160.

Boozer, C.N., J.A.Nasser, S.B.Heymsfield, V.Wang, G.Chen and J.L.Solomon (2001). An Herbal supplement containing Ma Huang-Guarana for weight loss: a randomized, double –blind trial. *Int. J. Obese. Relat. Metab. Disord*., 25: 316-324.

Boozer, C.N., P.A. Daly, P.Homel, J.L.Solomon, D.Blanchard, J.A.Nasser, R.Strauss and T.Meredith (2002). Herbal ephedra / caffeine for weight loss: a 6-month randomized safety and efficacy trial. *Int. J. Obese. Relat. Metab. Disord*., 26: 593-604.

Bu,Y., T.Shi, M.Meng, G.Kong, Y.Tian,Q.Chen, X.Yao, G.Feng, H.Cheng and Z.Lu (2011). A novel screening model for the molecular drug for diabetes and obesity based on tyrosine phosphatase Shp2. Bioorg. *Med. Chem. Lett*., 15:21(2): 874-878.

Feng, Y., S.L.Huang, W. Dou, S.Zhang, J.H.Chen, Y.Shen, J.H.Shen and Y.Leng (2010). Emodin, a natural product, selectively inhibits 11 beta-hydroxysteroid dehydrogenase type I and ameliorates metabolic disorder in diet-induced obese mice. *Br. J. Pharmacol*., 161(1): 113-126.

Greive, M. (1971). *A Modern Herbal*. (C.F. Leyal ed.), 2nd Ed. Dovers publications, Inc. New York.

Hasan, R., A.Javaid and S.Ishtiaq (2006). The effects of weight reducing herbal drug (Mehzileen) on the lipid profile of rabbits *Oryctolagus cuniculus*. *Int. J. Biol. Biotech*., 3(2): 433-437.

Haslam, D.W. and W.P. James (2005). Obesity. *Lancet.,* 366(9492): 1197-1209.

Klein, S., L.Fontana, V.L.Young, A.R.Coggan, C.Kilo, B.W.Petterson and B.S.Mohammed (2004). Absence of an effect of liposuction on insulin action and risk factors for coronary heart disease. *N. Engl. J. Med*., 350: 2549-2557.

Lahlou, S., A. Tahraui, Z. Israili and B. Lyoussi (2007). Diuretic activity of the aqueous extracts of *Carum carvi* and *Tanacetum vulgare* in normal rats. *J. Ethnopharcol*., 110(3): 458-463.

Landsberg, L. (1999). Weight reduction and obesity. *Clin. Exp. Hypertens*., 21(5-6): 763-768.

Meral, I. and M. Kanter (2003). Effects of *Nigella sativa L*. and *Urtica dioica L*. on selected mineral status and hematological values in CCl4 - treated rats. *Biol. Trace Elem. Res*., 96(1-3): 263-270.

Moreland, A.F. (1965). Collection and withdrawal of body fluids and infusion techniques. In: *Methods of animal experimentation* (W.I. Gray ed.) Vol.1, Academic Press,New York. pp.1-42.

Pittler, M.H. and E.Ernst (2004). Dietary supplements for body-weight reduction: a systematic review. *Am. J. Clin. Nutr*., 79: 529-536.

Qidwai,W., H.B.Hamza, R.Qureshi and A.Gilani (2009). Effectiveness, safety and tolerability of powdered *Nigella sativa* (kalonji) seed in casules on serum lipid levels, blood sugar, blood pressure and body weight in adults: results of a randomized, double-blind controlled trial. *J. Altern. Complemet Med*., 15(6): 639-644.

Sadiq, S., A.H.Nagi, M.Shahzad and A.Zia (2010). The reno-protective effect of aqueous extract of Carum carvi (black zeera) seeds in streptozotocin induced diabetic nephropathy in rodents. *Saudi J. Kidney Dis. Transpl*., 21(6): 1058-1065.

Shekelle,P.G., M.L.Hardy, S.C.Morton, M.Maglione, W.A.Mojica, M.J.Suttorp, S.L.Rhodes, L.Jungvig and J.Gagne (2003). Effecacy and safety of *Ephedra* and ephedrine for weight loss and athletic performance: a meta-analysis. *JAMA*., 289: 1537-1545.

Stanko, R.T. and J.E. Arch (1996). Inhibition of regain in body weight and fat with addition of 3-carbon compounds to the diet with hyper energetic refeeding after weight reduction. *Int. J. Obese. Relat. Metab. Disord*., 20: 925-930

Stewart, P.M., A.M.Wallace, R.Valentino, D.Burt, C.H.Shackleton and C.R.Edwards (1987). Mineralocorticoid activity of licorice: 11 Beta-hydroxysteroid dehydrogenase deficiency comes of age. *Lancet*., 2(8563): 821-824.

Vaskonen,T., E.Mervada, L.T. Seppanen and H. Karppanen (2001). Diet enrichment with calcium and magnesium enhances the cholesterol-lowering effect of plant sterol in obese Zucker rats. *Nutr. Metab. Cardiovasc. Dis*., 11(3): 158-167.

Westendorf, J. (1993). Anthranoid derivatives. In: *Adverse effects of herbal drugs II*.Springer-veerlag, Berlin, Heidelberg, Germany. pp. 105-118.

(*Accepted for publication September 2011*)