INDUCTION OF TYPE 2 DIABETES IN RATS BY IN-HOUSE PREPARED HIGH-FAT DIET AND LOW STREPTOZOTOCIN DOSE

Andressa Monteiro Terra, Wanderson Fernando Mello de Souza, Gisele Santos de Souza, Ana Luísa de Souza Gomes, Rutheneia Sofia José Tavares de Carvalho, Claudia Cardoso Netto, Ana Paula Machado da Rocha, Luiz Fernando Rodrigues Júnior, Ricardo Felipe Alves Moreira, Cristiane Barbosa Rocha

(Andressa.monteiroterra@gmail.com)

1 Food and Nutrition Postgraduate Program (PPGAN) – UNIRIO, Brazil
2 Institute of Biosciences, Federal University of the State of Rio de Janeiro (UNIRIO), Brazil
3 Biomedical Institute, Federal University of the State of Rio de Janeiro (UNIRIO), Brazil

The aim of the study was to develop a rat model that could replicate the metabolic characteristics of human type 2 diabetes. Prior permission was sought from the UNIRIO animal ethics committee for conducting this study (CEUA-UNIRIO/2012/14-2). It was carried out during 5 weeks with nineteen Wistar rats (2 months of age – CEMIB, UNICAMP): group 1 (G1) = 10 non-diabetic rats and group 2 (G2) = 9 diabetic rats. G1 rats received a normal diet (label information: carbohydrates = 45.5%, fats = 4.0% and proteins = 22.0%) with a caloric value of 306 kcal/100 g. On the other hand, a high-fat diet was offered for G2 rats. This last diet was in-house produced using the powdered normal diet, chocolate, peanut and biscuit (3:2:2:1). Based on proximal composition tables, the following profile was estimated for this diet: carbohydrates = 45.2%, fats = 25.5% and proteins = 16.6%. So, its caloric value was 477.1 kcal/100 g. After three weeks of the beginning of the study, G2 rats received intraperitoneally a low dose of streptozotocin (STZ) (35 mg kg⁻¹ of body mass). Body weight and plasma glucose level were monitored on days 1, 21 and 35. No differences were observed between the body weight gain [G1 = (72.8 ± 27.6)g; G2 = (85.5 ± 23.8)g] of both groups, comparing the initial moment of the study and day 21. The mean plasma glucose levels of both groups also remained unaltered during the first three weeks and their values were not statistically different (p>0.05) from each other. After the STZ treatment, the diabetic rats quickly developed polydipsia and polyuria. At the end of the study, the plasma glucose level of G2 increased [(332.0 ± 67.3)mg dL⁻¹], being statistically different from the mean plasma glucose level of G1 [(92.0 ± 9.5)mg dL⁻¹]. From day 21 to day 35, the body weight of G1 rats continued to increase, while the G2 rats lost mass. Thus, we can conclude that the high-fat diet alone was not able to induce the proper symptoms of type 2 diabetes, being necessary its association with the low STZ dose.

Keywords: type 2 diabetes animal model, high-fat diet, low streptozotocin dose.

Acknowledgement: UNIRIO, FAPERJ, CAPES and CNPq.