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Influence of Caloric Value of Food on Gastric Emptying of Pellets

B. BÜRMEŒ, I. LOCATELLI, A. MRHAR, M. BOGATAJ

Faculty of Pharmacy, University of Ljubljana, Ařkerčeva cesta 7, SI-1000 Ljubljana, Slovenia

E-mail: igor.locatelli@ffa.uni-lj.si (I. Locatelli)

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Administration of pellets in fed stomach state can prolong the gastric emptying of pellets in comparison to the administration under fasting conditions [1]. On the basis of literature data we aimed to investigate the influence of caloric value of food on gastric emptying of pellets.

A systematic literature search on evaluation of human gastric emptying of pellets based on the technique of gamma scintigraphy was performed in the MEDLINE database. Studies estimating the gastric emptying of pellets under fed conditions were focused. In addition to the caloric value of the meal, a special attention was made on other factors such as, pellets size and density, pellets formulation (filled into capsules or compressed into tablets), a time delay for pellets administration in relation to the time of meal completion, and refreshments provision. The majority of pellets gastric emptying data was presented in terms of pellets t_{50} values – a time when 50% of the administered pellets emptied the stomach. In order to evaluate the influence of the caloric value of the meal on pellets t_{50} values a linear regression model was built. In this model the caloric value was regarded as a categorical variable, which was recorded into dummy variables with the lowest caloric value set as a reference. In total 17 studies were recovered, however, only 6 of them met the selection criteria: pellets density between 1.2 and 1.5 g/cm³, administration of the pellets at the time of meal completion, pellets filled into capsules, and pellets size in the range from 0.6 to 1.4 mm. In these studies 48 individual values of pellets t_{50} were collected (6 or 8 subjects per study) and the obtained caloric values were 1200, 1500, 2300, 2800, and 3600 kJ. Mean value of t_{50} of pellets administered right after the 1200 kJ meal was 136 min. In comparison to the 1200 kJ meal, the mean values of t_{50} of pellets administered right after 2800 and 3600 kJ meal were significantly longer; 212 min ($p=0.031$) and 263 min ($p=0.003$), respectively. No significant difference in terms of mean values of pellets t_{50} could be noted between the 1200 kJ meal and 1500 or 2300 kJ meal.

Our results suggest that gastric emptying of pellets can be more prolonged if administered along with the food with higher caloric value.

- [1] Yuen KH, Deshmukh AA, Newton JM, Short M, Melchor R. Gastrointestinal transit and absorption of theophylline from a multiparticulate controlled release formulation. *Int J Pharm.* 1993; 97: 61–77. doi:10.1016/0378-5173(93)90127-2