Research Section

THE EFFECT OF AVOCADO OILS ON SOME LIVER CHARACTERISTICS IN GROWING RATS

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Abstract—The effects of various avocado oils on some liver characteristics were studied in growing rats. The rats were fed diets containing 10% (w/w) avocado oil for 4 wk. In comparison with rats fed refined oil obtained from cored fruit by centrifugal separation, rats fed unrefined avocado oil obtained by solvent extraction from the intact fruit, or refined avocado oil containing avocado-seed oil, showed significant growth inhibition, an increase in the amount of hepatic lipids (identified as steatosis by histopathological examination), and a decrease in levels of triglycerides in blood. Rats fed the refined oil containing unsaponifiable material prepared from unrefined oil from the intact fruit showed similar responses. Fatty livers were not induced by feeding rats unrefined avocado oil obtained from intact fruit by centrifugal separation, although a significant decrease in blood triglycerides was observed. There were no significant differences between groups in serum total protein, albumin or bilirubin content or in alanine aminotransferase activity. However, serum alkaline phosphatase activity was increased in rats fed the seed oil, the unrefined solvent-extracted oil from intact fruit, or the unsaponifiables, and aspartate aminotransferase activity was significantly increased in the group fed avocado-seed oil. These data suggest that consumption of avocado oil extracted from intact fruit may cause changes in liver metabolism.

INTRODUCTION

The avocado is one of the few cultivated fruits in which the oil is the main component, on a dry-weight basis (Winton and Winton, 1949). The oil, which makes up 15–30% of the fresh weight, depending on the variety, is unsaturated and the predominant fatty acid is oleic (Mazliak, 1965). In view of this, it is interesting to note that the consumption of oleic acid has recently been advocated for the prevention of atherosclerosis (Grundy, 1987). While crude avocado oil is mainly used in the cosmetics industry, the refined form has recently been introduced into the world food market.

The two major methods of production of the oil are organic solvent extraction and centrifugal force separation. The oil is extracted from the hard or soft mature fruit, either cored or intact (Werman and Neeman, 1987). Studies by Valeri and Gimeno (1953) indicated that the seed contains toxic factors, and growing rats fed the dry or fresh seed died after 80–130 or 40–336 hr, respectively. Preliminary studies carried out in our laboratory showed a significant growth inhibition and liver enlargement in weanling rats fed the oil that had been extracted from avocado seed using either chloroform or petroleum ether. Over the 28-day study, in the groups treated with avocado-seed oil body-weight gain was 50 g and relative liver weight reached 4%, in comparison with 100 g and 3.3%, respectively, in the control group (M. J. Werman, unpublished data, 1987). Since oil from the seed may be present in some commercial avocado oils, it is of interest to determine whether avocado oils can cause metabolic alterations. The purpose of this study, therefore, was to evaluate the effect of different types of avocado oils on some liver characteristics in growing rats.

MATERIALS AND METHODS

Animals and treatment. Female Charles River CD rats, weighing 80–90 g were obtained from the animal colony of the Department of Food Engineering and Biotechnology, Technion, Israel. They were randomly divided into six groups, each of seven rats, which were housed individually and maintained at 25°C with a 12-hr light/dark cycle. Food and water were given ad lib. Each group was fed the basic diet, ground commercial rat feed (obtained from Asia

Abbreviations: ALP = alkaline phosphatase; ALAT = alanine aminotransferase; ASAT = aspartate aminotransferase; DDT = dichlorodiphenyltrichloroethane; H and E = haematoxylin and eosin; LSD = least significant difference; RAO = refined avocado oil; TG = triglycerides.