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The effect of an oral nutritional supplement enriched with fish oil on weight-loss in patients with pancreatic cancer

Intro

Nutritional decline is almost always a factor in pancreatic cancer (Wigmore et al, 1997a). Patients with gastrointestinal cancer often experience weight loss that is resistant to treatment, which is associated with a reduced chance of survival and a worse quality of life overall. (DeWys et al, 1980; Ovesen et al, 1993a). However, it has no nutritive benefit to give standard oral nutritional supplements to children (Evans et al, 1987; Ovesen as al, 1993b). In this approach, metabolic pathways that help cancer patients lose weight may also prevent the buildup of fat in the body (Moldawer and Copeland, 1997). Tumor-bearing mice can develop cachexia when injected with pro-inflammatory cytokines, such as interleukin-6 (IL-6), and monoclonal antibodies to these cytokines prevent cachexia (McNamara et al, 1992). Remaining energy expenditure and nutritional intake in pancreatic cancer patients who are losing weight have been connected to the acute phase protein response (APPR), according to Falconer et al. (1994a) and Wigmore et al. (1997b). In pancreatic cancer patients, the APPR is also the strongest independent indication of poor prognosis (Falconer et al, 1995). Cytokines that promote inflammation, such as interleukin 6, have been shown to have an impact on the AKT (Heinrich et al, 1990). Cachexia in pancreatic cancer patients appears to be associated to pro-inflammatory cytokine activity.

Previous studies have shown that cancer patients can improve their nutritional status by manipulating their inflammatory response (McMillan et al, 1997). Pro-inflammatory cytokines like IL-1 and TNF have been shown to be reduced by healthy PBMCs in response to endotoxin exposure through immunomodulatory effects (Meydani et al, 1993). High-purity EPA inhibited IL-6 production in peripheral blood cells of oncology patients (Wigmore et al, 1997c). In the MAC16 colon adenocarcinoma model, EPA has anti-tumour and anti-cachectic characteristics (Falconer et al, 1994b) (Beck et al, 1991). People with cachexia who have tumors create a proteolysis-triggering factor, which tumor cells also produce (Todorov et al, 1996). EPA may function by preventing this factor from influencing the organs (Tisdale, 1996). Unresectable pancreatic cancer patients have been proven to maintain stable weight with the use of EPA and DHA supplements (approximately 2.2 g/day each) (Wigmore et al, 1996; Barber et al, 1997). To increase muscle mass and thus weight, it is evident that additional macronutrients are required. Giving patients with advanced pancreatic cancer more calories, protein, and fish oil was the focus of the current study.

Method & Model

In the method & model part, I categorized into two parts as the first one is materials including Patients and Fish oil-enriched nutritional supplement, the second part is the methods including Toxicity assessment, Nutritional and Metabolic assessment, Performance status and appetite, survival, and statistical analysis.

The materials part, patients with unresectable adenocarcinoma of the pancreas with signs of persistent weight loss were eligible for enrollment. To qualify for enrollment, patients required to have a WHO performance status of 2. All patients signed informed consent forms. We eliminated patients who

had recent surgery or endoscopic stenting, had other active medical illnesses, a cancer, or were taking medications that could affect metabolism or weight. No radiation or chemotherapy was given. Lothian Ethical Committee approved the study protocol. The study enrolled 20 patients. Adenocarcinoma of the pancreas was confirmed by histology (16/20) or by surgical or radiological findings (4/20). 17 patients had pancreatic cancer in the head and 3 in the body. No one was jaundiced, pyrexial, ascitic, extremely anemic, or on steroids when they were enrolled. All patients were adequately controlled in pain. Patients with steatorrhea were given pancreatic enzyme supplements. Patients were examined roughly monthly until death, withdrawal from the research, or until their condition deteriorated to the point where further examination was impossible. It was a stand-alone trial. The fish oil-rich dietary supplement was supplied by Abbott Laboratories, Columbus, Ohio. Appendix 1 shows the product's composition. Patients were asked to refrigerate the goods. Two cans per day provided 610 kcal, 32.2 g protein, 2.2 g EPA, and 0.96 g DHA. Compliance was measured by a diary of intake, return of empty can labels, and plasma fatty acid measurement at baseline and 3 weeks.

The methods part, the toxicity assessment, CBC, electrolytes, urea, glucose, and liver function tests were drawn. At the Royal Infirmary, Edinburgh, UK, they were assessed using standard automated techniques. Each appointment included a history and comprehensive clinical examination. General practitioners' or clinical examination-reported toxicity was documented. The nutritional & metabolic assessment, there are sub-topics in this one including Anthropometry, Body composition analysis, Nutritional intake, Energy expenditure, Acute phase protein response and Fatty acid analysis which the first one is about height, pre-illness steady weight, and weight-loss duration were recorded initially. On spring balance scales (Seca, Germany) without shoes and light clothing. The MAMC was estimated using Jelliffe's equation (Jelliffe, 1966). It was measured with Harpenden calipers (John Bull British Indicators Ltd, UK). The mean of three measurements was reported. Next one is body composition analysis, it used a Xitron 4000B multiple frequency bio-electrical impedence analyser (Xitron Technologies). All tests were performed supine, limbs apart. This included the metacarpal and metatarsal heads. The same limbs were used for all measurements. Resistance was 200 Hz. Body water was calculated using formulae tested in a similar patient group (Hannan et al, 1995). The lean body mass was computed using the 73 percent water assumption (Shizgal, 1990). Thirdly, nutritional intake, the patients' daily calorie intake was evaluated at baseline and 3 weeks after supplementation. The values were derived from a 3-day food diary using CompEat 4 software (Nutrition Systems, London, UK). Next, energy expenditure, resting energy expenditure (REE) was evaluated at baseline and 3 weeks using a vented hood system (Deltatrac II, Datex, Helsinki, Finland). Patients arrived at 08:00 and supined for 30 minutes. Thermoneutral measurements were made with patients' supine for 30 minutes. The first 10 minutes of data were eliminated and the rest averaged. Each measurement was calibrated. The acute phase protein response, The APPR was confirmed by measuring serum CRP (Abbott Diagnostic, Maidenhead, UK). This assay's detection limit is 10 mg 1^{-1}. The last one, fatty acid analysis, Plasma phospholipid fatty acid analysis was conducted by gas chromatography as described before (Wigmore et al, 1996).

The Performance status and appetite, Karnofsky performance was assessed prior to supplementation, three weeks later, and monthly thereafter. The appetite was rated from 0 to 10, with 0 being no appetite and 10 being a very good appetite (Simons et al, 1996). On the survival, survival was tracked from diagnosis until death. When histological proof of pancreatic cancer was missing, unambiguous surgical or radiological findings were used to determine diagnosis. The statistical analysis is essential because the median and interquartile range are shown. The study used intention-to-treat analysis. Due to patient deterioration in such a palliative intervention research, data were available on 18 patients at 3 weeks and 13 patients at 7 weeks. The Wilcoxon signed rank test was used for paired comparisons. Significance was defined as a P-value less than 0.05.

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Result

Patients with advanced pancreatic cancer appear to stabilize their weight with oral EPA. The purpose of this trial was to explore if giving these individuals an oral nutritional supplement together with EPA would help them gain weight. Twenty patients with incurable pancreatic cancer were given two cans of a fish oil-rich dietary supplement each day. It has 310 calories, 16.1 grams of protein, and 1.09 grams of EPA in each can. Their weight, body composition, dietary intake, REE and performance were assessed. Each patient consumed 1.9 cans each day. The average weight loss for all patients was 2.9 kg per month at the start of treatment. After taking the fish oil-rich supplement for 3 and 7 weeks, patients gained an average of 1 kilogram (P = 0.024) and 2 kilograms (P = 0.033). (P = 0.002), it increased by 400 kcal per day. Lean body mass and REE per kg of total body weight decreased. 3 weeks later, both performance and appetite had improved significantly. To the surprise of researchers, advanced pancreatic cancer patients may benefit from the use of an EPA-rich supplement, which has been shown to reverse cachexia in these patients.

Reference

Barber, M. D., Ross, J. A., Voss, A. C., Tisdale, M. J., & Fearon, K. C. H. (1999, August 13). *The effect of an oral nutritional supplement enriched with fish oil on weight-loss in patients with pancreatic cancer*. Nature News. Retrieved January 30, 2022, from https://www.nature.com/articles/6690654

Appendix

Table 1 Baseline characteristics of study patients with advanced pancreatic cancer ($n = 20$)

Weight (kg)	55.2 (48.8–61.2)
Body mass index (kg m^{-2})	19.8 (17.8–21.8)
Rate of weight change per month (kg)	−2.9 (−4.4—2.2)
Percentage weight loss	17.9 (15.9–22.8)
Mid arm muscle circumference (cm)	20.8 (18.4–22.4)
Triceps skinfold thickness (mm)	11.1 (7.8–15.9)
Percentage total body water	52.9 (51.2–56.1)
Lean body mass (kg)	41.5 (38.1–44.8)
Fat mass (kg)	14.5 (12.3–16.7)
C-reactive protein (mg l^{-1})	10 (<10–27)
Karnofsky performance status[a]	85 (80–90)
Appetite[b]	5 (3–7)

Figures are median (interquartile range). [a]From a score of 10 (moribund) to 100 (normal). [b]From a score of 0 (none) to 10 (excellent).