Short Communication

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A Study on Protein Extraction and Nutritional Evaluation of *Ulva fasciata* of Arabian Sea

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Ulva faciata, the marine algae widely distributed on the coastal region of Pakistan may be used for supplementing food [1-4]. The algae, inspite of having valuable nutrients [5-8], is not only wasted but is a constant source of pollution during deterioration. The presence of marine toxins in certain green algae have already been reported [11] and the *Aspergillus* spp. [16] known to form more than 27 mycotoxins have been detected in edible materials [17, 18].

The present work on *U. fasciata* is undertaken as most of the species of genus *Ulva (Cholorophyta)* are edible [9-10].

Seaweed was collected from Paradise Point, a coastal region of Karachi in the month of December-March. Two hundred grams of fresh *U. fasciata* was homogenized with 600 ml of the deionized water in a warning blender for 30 mins. and the homogenate was filtered through double layered muslin cloth to remove the fibrous materials. The filtrate was acidified to pH 4.5 and centrifuged at 300 rpm. The residue was dispersed in deionized water and dissolved at 60° for 20 mins. The dissolved protein were lyophilized.

Biochemical analysis. The biochemical analysis was carried out on (a) extracted protein residue and on (b) air dried weed mass as described below.

(a) Extracted protein material was subjected to analysis by different methods. Estimation of the total nitrogen and crude protein in the extracted material was carried out by micro-Kjeldahl digestion and distillaltion method [12]. The percentage of nitrogen was converted to percentage of protein by multiplying it with 6.38. Moisture and ash (inorganic elements) in the extracted material was carried out by methods described in AOAC [13]. Amount of soluble carbohydrate and total lipid was also estimated [14]].

(b) The dried weed was analyzed for Aflatoxin BP_1 using the Velasco Fluorotoxin meter from Pacific Scientific USA and also for determination of aflatoxin B_1.

Preparation of the sample. Marine algae (500 g) was grined and 50 g of the sample was soaked in a mixture of acetone and water (85:15), blended for about 10-15 mins. and filtered through Whatman filter paper 1. The supernatent (90 ml) was mixed with ferric gel (according to the Remern described in the manual of Velasco Fluorotoxin Meter). The decolourised supernatent was filtered and the filtrate (180 ml) diluted with 360 ml of the distilled water was extracted twice with 50 ml of chloroform. The solvent was evaporated and the residue was dissolved in 1 ml of a mixture of chloroform and methanol (94:4).

Method of estimation. The micro-column in duplicate were prepared according to the instruction of the manual of Velasco Flourotoxin meter.

The sample (1 ml) was subjected to the micro-column of Flourotoxin meter with the help of a syringe and allowed to pass for 5-10 mins. for adsorption. The aflatoxin B_1 was retained by the Flurosil layer in the micro-column while the rest of the components were passed through. One ml of a mixture of chloroform and methanol (96:4)was further added to wet the column and the aflatoxin B_1 was estimated in µg/kg of the sample.

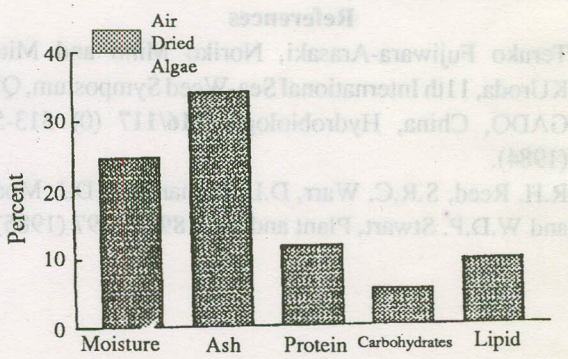

Fig. 1. Biochemical analysis of air dried algae.

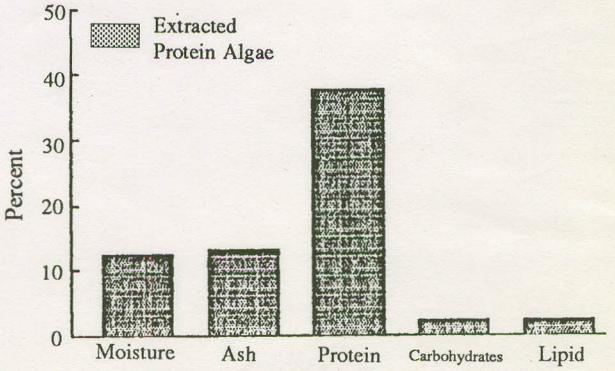

Fig. 2. Biochemical analysis of extracted protein algae.

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The results of chemical analysis of extracted protein and air dried algae are summarized in Fig. 1 - 2. The aflatoxins present in certain foods are shown in Table 1. The level of aflatoxin B_1 at in *U. fasciata* 14 µg/kg indicates its non toxic effect on diet supplementation, while as the 20 µg/kg (200 ppb) of aflatoxin is reported as gras (general regarded as safe) and has been recommended as the limit of safety for human consumption.

The study revealed that marine algae may be a good source of protein supplementation in human diet in view of its high protein contents and low toxicity level.

TABLE 1. THE AFLATOXIN LEVEL IN VARIOUS HUMAN FOODS.

Food	Location	Range µg/kg	Mycotoxin	No. of sample	Reference
1.Meat	U.K.(1982)	< 1	Aflatoxin	19	(16)
2.Bakery product	"	1-14	"	8	"
3.Fruits/nuts	"	1-8900	"	5	"
4.Cheese	"	7	Ochrotoxin	19	"
5.Cereals	Japan (1984)	2-36	Aflatoxin	52	(17)
6.Beans	"	20	"	610	"
7.Corn products	"	73	"	23	"
8.Corn flour	"	6-47	"	11	"
9.Pistachio	"	11-2132	"	54	"
10.*Ulva fasciata*	Pakistan 1991	14 ppb	Aflatoxin (B_1)	10	Present work

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