Original Article

Should variation of serum lipid levels be considered a risk factor for the development of basal cell carcinoma?

Abbas Zamanian[1], Ghasem Rahmatpour Rokni[2], Akram Ansar[2], Pezhman Mobasher[3], Ghazaleh Ahmadi Jazi[4]

[1]Skin and Stem Cell Research Center, Department of Dermatology, Tehran University of Medical Sciences, Tehran, Iran, Department of Dermatology, Rasoul-e Akram Hospital, Iran University of Medical Sciences, Tehran, Iran, [2]Department of Dermatology, Hamedan University of Medical Sciences, Hamedan, Iran, [3]Skin Diseases and Leishmaniasis Research Center, Department of Dermatology, Isfahan University of Medical Sciences, Isfahan, Iran, Skin and Stem Cell Research Center, Department of Dermatology, Tehran University of Medical Sciences, Tehran, Iran, [4]Medical Ethics and History of Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Background: Basal cell carcinoma (BCC) is the most common cutaneous neoplasm in human beings. Ultraviolet radiation is one of the most important predisposing factors for BCC. Although some recent investigations have shown a high serum level of phospholipids in actinic keratosis and BCC, this subject is still debated and needs approval. This study aimed to evaluate the association between serum lipid level and development of cutaneous BCC.

Materials and Methods: In this case–control study, lipid profile including triglyceride (TG), Cholesterol (CHOL), high-density lipoprotein (HDL) and low-density lipoprotein (LDL) were measured in 30 patients with BCC and 30 healthy controls. Data were analyzed by descriptive statistical tests including t tests and Chi square test.

Results: This study shows that the mean age of the case and control groups were 63.93 ± 12.09 and 61.57 ± 21.1 years (mean ± SD), respectively. The average amount of triglyceride, cholesterol, HDL and LDL in the BCC patients were 139.73 ± 69.11 mg/dl, 179.20 ± 43.42 mg/dl, 39.40 ± 9.30 mg/dl and 110.70 ± 34.13 mg/dl, respectively, whereas these amounts in the control group were 141.83 ± 80.41 mg/dl, 173.60 ± 96.32 mg/dl, 36.97 ± 6.35 mg/dl, 110.70 ± 34.13 mg/dl and 104.87 ± 30.85 mg/dl, respectively. No significant difference was found in the lipid profile of the case and control groups ($P > 0.05$%).

Conclusion: This study shows that the serum lipid levels in patients with BCC has no significant difference in comparison with the control group and, therefore, relevance between BCC and serum lipid level is not proven. Further studies with a larger sample size are necessary for evaluating this subject.

Key Words: Basal cell carcinoma, cutaneous oncology, non-melanoma skin cancer, phospholipids, skin cancer, skin cancer prevention and early detection

Address for correspondence:
Dr. Pezhman Mobasher, Skin and Stem Cell Research Center, Tehran University of Medical Sciences, Tehran, Iran.
E-mail: mobasherpezhman@gmail.com
Received: 27.2.2013, **Accepted:** 12.3.2014

Access this article online	
Quick Response Code:	Website: www.advbiores.net
	DOI: 10.4103/2277-9175.129704

INTRODUCTION

Basal cell carcinoma (BCC) is the most common cutaneous cancer in humans, comprising 75-80% of skin cancers.[1] The history of childhood sunburn and intermittent exposure to sunlight has an important role in increasing its incidence.[2,3] The incidence of BCC also increases with age.[4] Apart from the exposure to

How to cite this article: Zamanian A, Rokni GR, Ansar A, Mobasher P, Jazi GA. Should variation of serum lipid levels be considered a risk factor for the development of basal cell carcinoma?. Adv Biomed Res 2014;3:108.

ultraviolet radiation, which is the single most important risk factor for developing skin cancers,[5] there are some other known risk factors such as lymphoma/leukemia, AIDS and other immune-compromised conditions, radiotherapy, X-ray exposure, arsenic toxicity, infection with human papilloma virus, stasis dermatitis, scar due to thermal burn and Plus long-wave ultraviolet light (PUVA) therapy.[1,6] Alterations in plasma lipids and lipoproteins have been reported in association with some skin cancers.[7] Additionally, more content of phospholipids and cholesterol in cancerous and pre-cancerous lesions of the skin have been found compared with normal tissue. Based on these findings, it has been hypothesized that a high-fat diet may have a role in developing squamous cell carcinoma,[8] although there is still some controversy.[9] The aim of our study was to evaluate the lipid profile in patients with BCC, trying to find any association between abnormal lipid profile and BCC.

MATERIALS AND METHODS

One group of 30 patients with BCC and one group of 30 healthy adults were enrolled in the study. Patients with BCC were randomly selected from those referred to our Department of Dermatology during Jan to Mar 2008 if they had no history of hyperlipidemia, smoking, obesity, alcoholism, diabetes mellitus and Cushing's syndrome. Patients with long-term use of corticosteroids and other drugs (e.g., Estrogens) effective in lipid profile were not included in the study. The control group consisted of healthy adults with no history of skin cancers, with the similar inclusion criteria to the case group. The two groups were matched by age, sex and weight.

The purpose of the study was explained to each of the participants and a consent form was obtained from all of them. At first, physical examination was performed by a dermatologist and demographic information such as age, sex, duration and location of BCC lesions were recorded in designed forms. Then, 5 cc venous blood was taken from each participant (after 8-12 h of fasting) for measuring the serum lipid profile (TG, CHOL, HDL and LDL) by a photometric assay method. Normal range values and the amount of cut-off point for the lipids laboratory tests, according to the kit manufacturer, were as follows: TG <200 mg/dl, CHOL <200 mg/dl, HDL >35 mg/dl and LDL <130 mg/dl. Biopsy specimens from suspicious lesions were obtained for pathological confirmation. Statistical program SPSS version 16 for windows was used for data analysis. Mean values of each lipid profile were calculated in each group. Then, the lipid profile values were tested by Student's t-test between the two groups. *P* values less than 0.05 were considered as being significant.

RESULTS

The case group consisted of 16 males (53%) and 14 females, with a mean age of 63.93 ± 12.09 years (range 40-83 years). The control group included 17 males (56.7%) and 13 females (43.3%), with a mean age of 61.57 ± 6.67 years (range 38-78 years) ($P > 0.05$). The most common anatomical location of BCC was on the head and neck (24 cases, 80%). Other common sites of BCC were four - upper chest, three - upper limbs and one - lower limb lesions. The average of the TG level in the BCC and control groups was 139.73 ± 69.11 mg/dl and 141.83 ± 80.41 mg/dl, respectively ($P = 0.341$). There was no significant difference of the mean values of cholesterol level between the two groups (179.20 ± 43.42 mg/dl vs. 173.60 ± 96.32 mg/dl, $P = 0.794$). Although patients with BCC had higher mean values of HDL (39.40 ± 9.30 mg/dl) than healthy individuals (36.97 ± 6.35 mg/dl), the observed difference was not significant ($P = 0.804$). Similar results were observed regarding LDL levels (110.70 ± 34.13 mg/dl vs. 104.87 ± 30.85 mg/dl, $P = 0.396$). Table 1 demonstrates the mean values in the two groups.

DISCUSSION

Lipids play an important role in cellular integrity and action. Phospholipids are the main lipids in the cell membrane, while triglycerides are stored as cell energy reservoirs. LDL, synthesized mainly in the liver, is transported in the blood stream for supplying triglycerides and cholesterol in cells experiencing an LDL receptor. HDL returns cholesterol mainly to the liver.

Because of the role of lipid profile in maintenance of cell integrity and various biological functions, including cell growth and division (normal and malignant tissues), the changes in lipid profile may have an association with cancer. BCC, which is the most common skin cancer, has been reported to be associated with some disturbances in the serum lipid profile.[10]

In our present study, serum analysis showed no difference of mean values of lipid profile between groups of patients with BCC and healthy adults. Although we could not find any changes in the lipid profiles of patients with BCC, Vural *et al*.,[10]

Table 1: Comparison of the mean of lipid profile in both groups

Lipid profile	Groups (*n*=30)		*P* value
	Case	Control	
TG	139.73±69.11	141.83±41.8	0.341
Cholesterol	179.2±42.43	173.6±32.96	0.794
HDL	39.4±9.3	36.97±6.35	0.804
LDL	110.7±34.13	104.87±30.85	0.396

TG: Triglyceride, LDL: Low-density lipoprotein, HDL: High-density lipoprotein

based on a prospective case–control study, reported that the levels of all lipid fractions were increased in both actinic keratosis (AK) and BCC. They also stated that serum cholesterol in BCC patients was significantly lower and serum phospholipid levels were significantly higher than those in the AK group. They concluded that an increase in the metabolically active serum phospholipids fraction is reflected in elevated neoplastic tissue phospholipids. Another study performed on patients with various malignancies revealed that total lipids, cholesterol and HDL cholesterol levels were inversely associated with the incidence of cancer, whereas triglyceride levels were significantly elevated in patients with cancer.[11] Chawda *et al*. also found an inverse relationship between lipid levels and occurrence of oral cancer, concluding that lower plasma lipid concentrations may be a useful indicator for detecting the initial changes observed in neoplastic processes.[9] Microscopic changes are likely to be the first detected changes in cancerous cells. One study showed that infrared spectroscopy of normal epidermis and basal cell carcinomas were significantly different by virtue of subtle differences in protein structure and nucleic acid content.[12] Some investigators reported a possible role of reactive oxygen species and lipid peroxides in the pathogenesis of a variety of diseases, particularly cancers, revealing an inverse correlation between lipid peroxidation and antioxidant defense mechanisms.[13]

Lipid contents of the daily diet, including lipid-soluble vitamins, are studied in BCC pathology. It has been shown that plasma antioxidants are decreased in the pre-cancerous lesions of AK and BCC, probably due to the long exposure to UV irradiation that is one of the most important factors in the etiology of AK and BCC, although α-tocopherol and RBC glutathione are most altered in BCC.[13] Heinen *et al*. surprisingly showed that dietary intake of antioxidants like vitamin C and vitamin E was associated with an increased BCC risk.[14] But, Van Dam *et al*. reported that intake of long-chain-3 fatty acids, retinol, vitamin C, vitamin D or vitamin E were not materially related to BCC risk.[15] Also, Hunter *et al*.[16] showed no significant association between risk of BCC and energy-adjusted intake of dietary fat, carotenoids with vitamin A activity and retinol, vitamin C, vitamin D and vitamin E, with or without supplements.

One limitation of our study was that only patients with BCC were included as cases. We did not consider other pre-neoplastic lesions such as AK. Special forms of BCC such as nevoid BCC syndrome, which presents with multiple lesions in the early ages, could get more information about the different lipid profile changes. We also did not follow our sample for any changes during the recurrence period. Further studies with large clinical samples are needed for evaluating the lipid prolife among different populations of skin cancer patients.

Although slightly increased serum levels of cholesterol and LDL in patients with BCC have been observed, there was no statistically significant difference between patients and healthy individuals with respect to the concern of subscales of lipid profile. Future studies are required to compare lipid profiles in different pre-cancerous and malignant forms of BCC.

REFERENCES

1. Ishioka P, Marques SA, Hirai AT, Marques ME, Hirata SH, Yamada S. Prevalence of precancerous skin lesions and non-melanoma skin cancer in Japanese-Braziliansin Bauru, São Paulo State, Brazil. Cad Saude Publica 2009;25:965-71.
2. Bakos RM, Kriz M, Mühlstädt M, Kunte C, Ruzicka T, Berking C. Risk factors for early-onset basal cell carcinoma in a German institution. Eur J Dermatol 2011;21:705-9.
3. Dessinioti C, Tzannis K, Sypsa V, Nikolaou V, Kypreou K, Antoniou C, *et al*. Epidemiologic risk factors of basal cell carcinoma development and ageat onset in a Southern European population from Greece. Exp Dermatol 2011;20:622-6.
4. Ollstein RN. Skin lesions in the elderly: Precancer and cancer. Care Manag J 2004;5:107-11.
5. Saladi RN, PersaudAN.The causes of skin cancer: A comprehensive review. Drugs Today (Barc) 2005;41:37-53.
6. Crowson AN. Basal cell carcinoma: Biology, morphology and clinical implications. Mod Pathol 2006;19(Suppl 2):S127-47.
7. Patel PS, Shah MH, Jha FP, Raval GN, Rawal RM, Patel MM, *et al*. Alterations in plasma lipid profile patterns in head and neck cancer and oralprecancerous conditions. Indian J Cancer 2004;41:25-31.
8. Ibiebele TI, van der Pols JC, Hughes MC, Marks GC, Williams GM, Green AC. Dietary pattern in association with squamous cell carcinoma of the skin: A prospective study. Am J Clin Nutr 2007;85:1401-8.
9. Chawda JG, Jain SS, Patel HR, Chaduvula N, Patel K. The relationship between serum lipid levels and the risk of oral cancer.Indian J Med Paediatr Oncol 2011;32:34-7.
10. Vural P, Canbaz M, Sekçuki D, Murat A. Lipid profile in actinic keratosis and basal cell carcinoma. Int J Dermatol 1999;38:439-42.
11. Raste AS, NaikPP. Clinical significance of lipid profile in cancer patients. Indian J Med Sci 2000;54:435-41.
12. McIntosh LM, Jackson M, Mantsch HH, Stranc MF, Pilavdzic D, Crowson AN. Infrared spectra of basal cell carcinomas are distinct from non-tumor-bearing skin components. J Invest Dermatol 1999;112:951-6.
13. Vural P, CanbazM, Selçuki D. Plasma antioxidant defense in actinic keratosis andbasal cell carcinoma. J Eur Acad Dermatol Venereol 1999;13:96-101.
14. Heinen MM, Hughes MC, Ibiebele TI, Marks GC, Green AC, van der Pols JC. Intake of antioxidant nutrients and the risk of skin cancer. Eur J Cancer 2007;43:2707-16.
15. van DamRM, Huang Z, Giovannucci E, Rimm EB, Hunter DJ, Colditz GA, *et al*. Diet and basal cell carcinoma of the skin in a prospective cohort ofmen. Am J Clin Nutr 2000;71:135-41.
16. Hunter DJ, Colditz GA, Stampfer MJ, Rosner B, Willett WC, Speizer FE. Diet and risk of basal cell carcinoma of the skin in a prospective cohort of women. Ann Epidemiol 1992;2:231-9.

Source of Support: Nil, **Conflict of Interest:** None declared.