The Main Milk Parameters and Risk of Cancer

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--**ABSTRACT**---
This review is one of the first to highlight an association between main milk parameters and cancer risk. In this review, milk components such as lactose, fat and protein related to cancer risk will be discussed. Milk with high fat and protein level obtained from dams having high live weight and cow breeds having high milk fat and protein such as Jersey have disadvantageous in terms of cancer risk. Sheep milk because of its high fat is the most risky milk compared to other animal species. Restriction of sheep milk intake may be useful for prevention of cancer derived from high fat intake. The milk fat content obtained from cows having twin calves is lower than that of cows having single calves. Milk obtained from dams having twin calves is more advantageous in terms of cancer than that of dams having singles. Milk protein content gradually decreases with advancing age of cow. Therefore, it can be said that milk from young animals is not suitable because of relatively high cancer risk. Winter season, high forage intake and hand milking that cause high fat yield is more risky.
Keywords: Milk, fat, protein, lactose, cancer, risk

I.   INTRODUCTION

Cancer risk is strongly affected by diet. The some studies on milk consumption and cancer risk show that dairy may protect against cancer, while others suggest that dairy may increase cancer risk. Cancer is the second leading cause of mortality worldwide [1]. A lot of studies have examined the relationship between dairy consumption and cancer risk. Milk is one of several environmental factors actively being investigated for its role in cancer. The most commonly consumed dairy products include milk, yogurt, cheese, butter and cream. Some studies show that dairy pro ducts consumption may reduce the risk of colorectal cancer [2, 3]. Some components such as calcium, vitamin D and lacdic acid bacteria of milk may possibly protect against colorectal cancer. A lot of studies show that high dairy consumption may increase the risk of prostate cancer [4]. In this review, important milk parameters such as lactose, fat and protein related to cancer risk will be discussed. At the same time, it will be discussed animal and environmental factors affecting these milk parameters. This review is one of the first to highlight an association between animal and environmental factors and cancer risk.

II.   RISK FACTORS IN MILK

1.1. Lactose

The lactose contained in the milk, which, like glucose, can be used as a fuel by cancer cells. Therefore, lactose is a risk factor for cancer. However, there was no satisfactory explanation in literature for high lactose levels that causes to cancer. A possible role of lactose in the development of ovarian cancer has been the focus of some research. Milk with a low amount of lactose may be an advantage for the risk of cancer. High body fat depots are important risk factor associated with cancer [5]. High lactose level in diet causes high body fat reserves [6]. So, high level of lactose is an important risk factor.

1.2. Fat

According to Kroenke et al. [7] high-fat dairy intake was associated with breast cancer risk. High milk fat consumption has been hypothesized to be a source of risk for several major cancers, including cancers of the colon and rectum, breast, and prostate [8]. Diets containing high animal fat (such as milk) have been identified as being associated with greatest risk [9]. According to Zhang et al. [5] cancer cases had higher total body fat and plasma glucose. Therefore, high body fat is a big risk. It should be noted high fat intake causes high body fat depots.

1.3. Protein

It has been known that different kinds of amino acids have different effects on health. Kritchevsky et al. [10] reported that the ratio of lysine to arginine in diet can influence can serum cholesterol levels. Intake of

these types of amino acids was significantly associated with plasma cholesterol, non- HDL cholesterol and other cholesterol fractions which are correlated in turn with cancer mortality rate of several studies [11,12]. The milk protein, casein, promotes the proliferation of cancer cells and the high consumption of milk protein is associated with cancer risks [13, 14]. From the above-mentioned studies, it is suggested that high protein intake may enhance the risk of some cancer types.

In the light of the above information, animal and environmental factors will be examined in terms of risk of cancer.

III. THE EFFECT OF ANIMAL AND ENVIRONMENTAL FACTORS ON RISK FACTORS
3.1. Fat
According to Wood et al., [15] there was a negative relationship between live weight of dam and fat percentage of cow milk. Breed of cows is important factor on milk fat percentages. Jersey breed have the highest milk fat percentage. However, Holstein cows have the lowest milk fat level [16]. According to this reports, dams having low live weight and Jersey cows have disadvantageous in terms of cancer risk. Cow milk contains less fat (3.7 %) than that of sheep (6.4 %) and goats (4.0%). Sheep milk contains more fat than that of goats [17]. According to this knowledge, sheep milk with high fat rates is the most risky milk. Restriction of sheep milk intake may be useful for prevention of cancer derived from high fat intake. The milk fat content obtained from cows having twin calves is lower than that of cows having single calves [18]. So we can say that milk obtained from dams having twin calves is more advantageous than that of dams having single calves. Generally, milk fat content remains relatively constant with advancing cow age [19]. Therefore, we cannot any choice for milk obtained from different dam ages. Milk fat percentages in summer months are less than winter months [20]. Low forage intake reduces milk total fat rates [16]. Obtained milk fat from machine milking is less than that of hand milking. Accordingly, we can say that winter season, high forage intake and hand milking that cause high fat yield is more risky.

3.2. Protein
Protein can be depressed at calving if animals are overly obese or underweight [15]. Milk obtained from such animals may be advantageous to reduce cancer risk associated with protein consumption.

Holsteins tend to have the lowest milk protein percentage, at between 3.15 and 3.25% protein, of all the traditional European breeds of economic importance. In contrast, Jersey's, at between 3.80 and 3.90% tend to be the highest [21]. Similarly to milk fat reports, Jersey breed has disadvantageous for milk protein levels.

While milk fat content remains relatively constant, milk protein content gradually decreases with advancing age of cow [19]. Therefore, milk from young animals is not desirable because of cancer risk.

According to Atashi et al. [22], cows which gave birth to calf with higher weight at birth, produced more fat and protein in the subsequent lactation. High calf weight is may be disadvantageous because of high protein and fat intake from milk.

Cow milk contains less protein (3.5 %) than that of sheep (5.5 %) and goats (3.6 %). Sheep milk contains more protein than that of goats [17]. According to this information, cow milk should be preferred for low protein consumption.

Milk protein percentage [23] and yield [24] are higher during fall and winter than spring and summer. High environmental temperatures can depress milk protein percentage.

3.3. Lactose
Sheep milk contains less lactose (4.7 %) than that of cows and goats. Goat milk contains more lactose (5.1%) than that of cow (4.9 %) [17]. According to this knowledge, sheep milk is the most suitable milk for low lactose intake. The milk lactose rates obtained from dams having twins are lower than that of dams having singles [25]. So it can be said that it will be relatively advantageous to prefer milk having low lactose rates obtained from dams giving birth to twins. According to Cakir and Cimen [25] no statistical differences were found in terms of milk lactose levels in dams giving birth to female and male offspring. The effect of offspring sex on milk lactose levels was not found. We cannot say any preference for different birth sex. To avoid of goat milk obtained from dams giving birth to singles may be a precaution for prevention of cancer derived from high lactose intake. Low forage intake reduces milk lactose level [16]. Levels of lactose are rather constant and not subject to large changes through genetic or nutritional manipulation.

IV. CONCLUSION
In fact, a great number of epidemiological studies of the relationship between dairy food and cancer, together with the research in the experimental animal models have demonstrated restriction of dairy intake could undoubtedly contribute to cancer prevention [26]. To sum up, we can say that consumption of higher dairy

products and high fat, protein and lactose levels in milk are related to a higher risk of some cancer types. According to evidence obtained from this review, we can say that dam factors such as breed, age, live weight affecting milk fat, protein and lactose levels should be investigated to know the risk of cancer. Further research on factors affecting milk parameters and cancer risk is needed. Being such an integral part of human nutrition, milk and its components will be a major focus in health problem in terms of cancer in the next years.

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