


Diet and cancer prevention: Dietary compounds, dietary MicroRNAs, and dietary exosomes

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Abstract

Cancer is one of main health public problems worldwide. Several factors are involved in beginning and development of cancer. Genetic and internal/external environmental factors can be as important agents that effect on emerging and development of several cancers. Diet and nutrition may be as one of important factors in prevention or treatment of various cancers. A large number studies indicated that suitable dietary patterns may help to cancer prevention or could inhibit development of tumor in cancer patients. Moreover, a large numbers studies indicated that a variety of dietary compounds such as curcumin, green tea, folat, selenium, and soy isoflavones show a wide range anti-cancer properties. It has been showed that these compounds via targeting a sequence of cellular and molecular pathways could be used as suitable options for cancer chemoprevention and cancer therapy. Recently, dietary microRNAs and exosomes have been emerged as attractive players in cancer prevention and cancer therapy. These molecules could change behavior of cancer cells via targeting various cellular and molecular pathways involved in cancer pathogenesis. Hence, the utilization of dietary compounds which are associated with powerful molecules such as microRNAs and exosomes and put them in dietary patterns could contribute to prevention or treatment of various cancers. Here, we summarized various studies that assessed effect of dietary patterns on cancer prevention shortly. Moreover, we highlighted the utilization of dietary compounds, dietary microRNAs, and dietary exosomes and their cellular and molecular pathways in cancer chemoprevention.

KEYWORDS

cancer, diet, dietary exosomes, dietary microRNA, dietary pattern, prevention

1 | INTRODUCTION

Cancer is known as one of major public health problems which are associated with a public health concern worldwide.¹ The assessing of different dimensions for this disease has led to identification of various factors involved in cancer pathogenesis. These findings could help to prevention and better treatment of various types of cancer.^{2,3} Various classes of factors participate in start and development of various cancers.⁴ Multiple lines evidences indicated that genetic and environmental factors involved in various stages of different malignancies.⁴ To date, researchers with more understanding of molecular/cellular pathways involved in different cancers could design many therapies and regimen for before and after cancer. But, with growth of human knowledge in the cellular and molecular pathways involved in different stages of cancers, obtain new data that could contribute to design novel therapies.^{2,3,5,6} Moreover, using of these data could lead to development of new therapies such as gene and cell therapy for treatment of cancer.^{5,7–10} Among of various factors involved in start and development of cancer, life style has a main role. Human dietary patterns could effect on human health in various ways. The suitable nutrition regimen has important effects on human health.¹¹ It observed that enough uptakes of various vitamins and fats could have positive effects on various diseases such as depression and cancer.^{12–15} Various studies indicated that suitable diet and dietary patterns may have key roles in prevention or even treatment of cancer.^{14,16} The intake of various fruits and diet with many antioxidant components may help to prevention of cancer. The inflammation is known as one of main factors for development of many cancers.^{15–19} The utilization of suitable dietary including antioxidant components may effect on development of cancer and inhibition it.^{15,17,18} It is found that a plant-based diet that limits red meat intake could be linked with reduced risk of breast cancer.¹⁹

Dietary compounds are known as one of important therapeutic agents which could affect on a variety of cellular and molecular pathways.^{20–22} A large number studies indicated that the utilization of various dietary compounds including green tea, curcumin, selenium, carotenoids, and vitamins could help to cancer prevention and treatment. Hence, it seems that the utilization of them in dietary pattern could be useful for cancer prevention and therapy.^{20–22} Recently, some studies indicated that dietary microRNAs and

exosomes have critical roles in change behavior various cells such as cancer cells. MicroRNAs (miRNAs) are known as small non-coding RNAs which act as epigenetic regulators.^{6,23–26} These molecules have critical roles in a variety of cellular and molecular pathways involved in cancer pathogenesis.^{27–31} Hence, these molecules could be used as diagnosis, and therapeutic biomarkers.³² It has been showed that dietary miRNAs could be as attractive tools for cancer prevention and therapy. Moreover, it has been showed that dietary exosomes and their cargos could be used as new candidate for cancer prevention and therapy.^{33–35} Here, we summarized the role of dietary patterns on prevention of cancer shortly. Moreover, we highlighted the utilization of dietary compounds, dietary miRNAs and dietary exosomes as powerful candidates for cancer prevention and therapy.

1.1 | Dietary patterns and cancer

Multiple lines evidence indicated that many factors involve in different stages of cancer.³⁶ These factors (including genetic and environmental factors) play key roles in start and development of different cancers.^{15,36,37} Dietary patterns are probably known as one of important factors that may be associated with various cancers. Few studies have examined effect dietary patterns on cancer prevention.^{14,38} Some evidences indicated that various dietary patterns cannot contribute to cancer prevention in different stages.¹⁴ On the other hand, some reports revealed that a healthy diet with plenty of vegetables and fruit may decrease risk of cancer. These studies indicated that the utilizing of suitable dietary patterns and particular vitamins may contribute to cancer prevention in certain groups of patients.³⁹ In a study, Rodriguez et al found that intake of vitamin E supplements for male smokers could decrease risk of prostate cancer. Their results showed that supplementation with alpha-tocopherol (a form of vitamin E) can reduce risk of prostate cancer.¹⁶ In four studies observed that vitamin E could decrease the risk of prostate cancer in past/recent and current smokers and those with low levels of this vitamin.^{39,40} Moyad et al⁴⁰ found that selenium and vitamin E are probably 2 of the main dietary supplements which utilization of them could decrease prostate cancer risk. Some reports revealed that there were no significant reduction between multivitamin, mineral supplementation, and mortality or incidence of cancer, while some reports show a possible prevention effect in cervical

cancer.⁴¹ In 2012, a review of nine studies assessed the effect of various vitamins and minerals on lung cancer risk. Their results showed that there was no evidence for recommending supplements of vitamins A, C, E, selenium, either alone or in different combinations, for the prevention of lung cancer and lung cancer mortality in healthy people. Moreover, some evidence indicated that the use of beta-carotene supplements could be related with a small increase in lung cancer incidence and mortality in smokers or persons exposed to asbestos.⁴² Finally, there are no strong evidences that dietary supplements and dietary patterns can contribute to prevention, control, and treat various cancers. But few small pilot studies have found that nutritional supplements and dietary patterns may contribute to prevention, treat and control of cancer for some subjects.^{14,41,43} Hence, choosing suitable dietary supplements can help to prevention of cancer and effective treatment during cancer. It seems that examining of various dietary patterns on cancer patients can be contribute to identifying of new dietary patterns that are effective on the prevention, treatment, and control of various cancers.

1.2 | Dietary compounds and cancer chemoprevention

Cancer chemoprevention is known as an approach which employed natural or synthetic agents to decrease or suppress cancer development and progression.^{20–22} It has been showed that dietary compounds could be used as a suitable therapeutic agent for cancer chemoprevention. The interesting of utilization of dietary compounds due to specific properties of them such as low toxicity compared with regular drugs. Multiple lines evidence indicated that a wide range of dietary chemo-preventive agents such as long-chain polyunsaturated fatty acids, green tea polyphenols (ie, catechins), carotenoids, curcumin, vitamins (ie, vitamin D and folate) glucosinolates/isothiocyanates, and minerals (ie, calcium and selenium) could be introduced into clinical application for cancer therapy^{20–22} (Table 1).

Curcumin is one of interesting phytochemicals which shows wide ranges anti-cancer properties.^{44–46} Several studies indicated that curcumin via targeting a sequence cellular and molecular pathways exert its therapeutic effects.^{44–46} A variety of cellular and molecular targets including microRNAs (miRNAs), NF- κ B, AP-1, COX-2, MMPs, cyclin D1, EGFR, Akt, β -catenin, adhesion molecules and TNF could be affected by curcumin^{44–47} (Figure 1).

Green tea is other natural components which is associated with wide ranges of therapeutic properties.⁴⁸ It has been showed that this plant is a rich source of proteins (including enzymes), amino acids, carbohydrates, lipids, vitamins (B, C, E) and minerals (ie, Ca, Mg, Cr, Fe, Zn, F, K).⁴⁹ Various studies indicated that is mostly therapeutic effects of Green tea is related with the abundance of polyphenols,

particularly flavonoids. Catechins (flavan-3-ols) including including epicatechin (EC), epicatechin-3-gallate (ECG), galliccatechin (GC), epigallocatechin (EGC), and predominant (–)-epigallocatechin-3-gallate (EGCG) are one of important flavonoids present in green tea leaves.²² It has been that Green tea exerts its anti-cancer properties via inhibition of growth tumor via targeting cellular and molecular involved in cell proliferation and angiogenesis. VEGFs are one of important targets which could be affected by this component.⁴⁸

Epigenetic mechanisms are important pathways which could be affected by dietary compounds in cancer chemoprevention.^{50,51} There are different mechanisms including DNA methylation, histone modifications, and microRNAs (miRNAs) which act as epigenetic regulators.^{6,24} It has been indicated that dietary compounds could affect on cancer prevention via targeting of epigenetic mechanisms.^{50,51} A large number studies revealed that bioactive phytochemicals are able to change expression of a variety of oncogenes and tumor suppressor genes via targeting epigenetic mechanisms involved in cancer initiation and progression.^{50,51} Moreover, the utilization of bioactive phytochemicals alone or in combination with other natural or synthetic agents could be associated with significant results against a variety of cancers.^{50,51}

Finally, it seems that the utilization of dietary compounds and put them in dietary patterns could be associated with significant results against prevention of a variety of cancers. Hence, we offer that the utilization of them could be employed as powerful candidates in dietary patterns which may contribute to new insights into cancer prevention (Table 2).

1.3 | Dietary microRNA and cancer prevention

MicroRNA (miRNA) is small noncoding RNAs which acts as epigenetic negative/positive regulators in various physiological processes.^{47,52–55} These molecules could act as a tumor suppressor or oncogene.^{56,57} It has been showed that these molecules are able to regulate a wide range of cellular and molecular processes such as growth, angiogenesis, cell death, invasive, and metastasis.^{27,58} Multiple line evidence indicated that deregulation of them could lead to disease condition.^{59–61} A variety of miRNAs could affect on initiation and development of various types of cancer. Hence, identification of them could contribute to better understanding of underlying cellular and molecular pathways and could lead to better treatment for patients with various diseases such as cancer. It has been showed that a variety of dietary compounds and bioactive foods could show inhibitory effects on cancer cells and also protective effects against cancer via modulating a variety of miRNAs involved in cancer pathogenesis.^{30,62,63} A large number studies indicated that

TABLE 1 A variety of dietary compounds which are associated with anti-cancer properties

Dietary compound (s)	Cancer	Target gene (s)	Effect (s)	Citation
Green tea	Bladder	PI3K/Akt, Bcl-2 family	The enhancing of apoptosis	106
	Glioblastoma	MMP-2, MT1-MMP	Inhibition of tumor growth	107
	Breast	VEGF	Inhibition of angiogenesis	108
Polyunsaturated fatty acids	Colon	COX-1 or COX-	Inhibition of tumor growth	109
	Breast	–	Inhibition of tumor growth	110
	Prostate	–	Inhibition of tumor growth	111
Glucosinolates/ isothiocyanates	Lung	–	Inhibition of growth tumor	112
	Stomach	–	Inhibition of growth tumor	113
	Colon	–	Inhibition of growth tumor	114
	Prostate	–	Inhibition of growth tumor	115
Carotenoids	Colon	cyclin D1, Bcl-2, and Bcl-xL	Induce apoptosis and inhibition of tumor growth	116
	Prostate	AKT, cyclin D1	Inhibition of tumor growth	117
	Breast	RARalpha and Cx43	Inhibition of tumor growth	118
Vitamin D	Colon	p21, MIB-1	Inhibition of tumor growth	119,120
Folate	Colon	COX2	Inhibition of tumor growth	121
Selenium	Leukemia	cyclin B1	Inhibition of cell proliferation	122
Calcium	Colon	COX2	Inhibition of tumor growth	121
Curcumin	Melanoma	COX-2	Inhibition of cell proliferation	123,124
	Colon	–	Inducing apoptosis, ROS, and ER stress	125
	Glioblastoma	–	Inducing apoptosis	126
	Gastric	p53, Bcl-2, Bax, and c-Myc	Inhibition of cell proliferation, Inducing apoptosis	127
	Breast	miR-29b-1-5p, PPARG, RRM2, SRSF1, and EPAS1	Inhibition of tumor growth	128,129
	Head and neck		Inhibition of tumor growth	130
	Lung	miR-30c	Increasing the sensitivity of Paclitaxel-resistant, Inhibition of tumor growth	131

dietary compounds and bioactive foods could change expression of various miRNAs involved in various well known cancer processes such as angiogenesis, cell cycle regulation, apoptosis, differentiation, inflammation, metastasis, and pathways involved in stress response.^{63–66} Hence, understanding the affect of dietary compounds and bioactive foods on miRNA expression and miRNA function could provide new insight on prevention approaches to decrease the burden of cancer.

Many studies assessed effect of essential nutrients, and phytochemicals on regulation of miRNA expression in various types of cancer cells and other model systems. Few studies investigated the role of various dietary patterns (ie, Western diet) or alterations in macronutrient content (ie, caloric restriction) on expression of miRNAs and miRNA function.⁶⁷

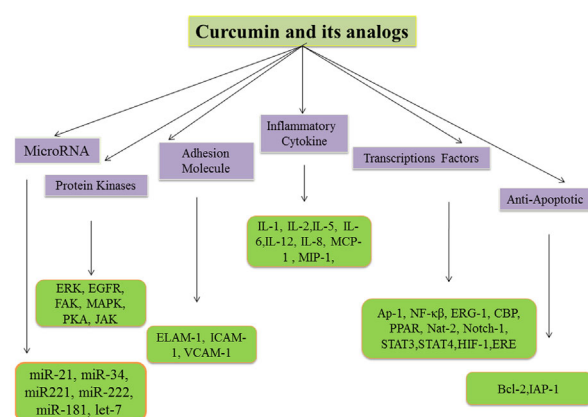
**FIGURE 1** Arious cellular and molecular targets which regulated by curcumin and its analogs

TABLE 2 Dietary microRNA involved in cancer prevention

Dietary component	Cell line	MicroRNA	Expression in cancer	Citation
Folate	TK-6	miR-222	Up regulation	70
RA	NB4	miR-15a	Up regulation	132
		miR-15b	Up regulation	132
		miR-16-1	Up regulation	132
		let-7a-3	Up regulation	132
		let-7c	Up regulation	132
		let-7d	Up regulation	132
		miR-223	Up regulation	132
		miR-342	Up regulation	132
		miR-107	Up regulation	132
		miR-181b	Down regulation	132
RA	SK-N-BE, LAN5 and SHSY-5Y	miR-10a	Up regulation	133
		miR-10b	Up regulation	133
1,25(OH) ₂ D	HL60 and U937	miR181a	Down regulation	134
		miR181b	Down regulation	134
1,25(OH) ₂ D	MCF12F	miR-26b	Down regulation	135
		miR-200c	Down regulation	135
		miR-200b	Down regulation	135
		miR-182	Down regulation	135
		Let-7b	Up regulation	135
Sodium selenite	LNCaP	miR-34b	Up regulation	136
		miR-34c	Up regulation	136
EGCG	HepG2	miR-18a	Down regulation	137
		miR-34b	Down regulation	137
		miR-193b	Down regulation	137
		miR-222	Down regulation	137
		miR-342	Down regulation	137
		let-7a,	Up regulation	137
		miR-16	Up regulation	137
		miR-221	Up regulation	137
Curcumin	BxPC-3	miR-22	Up regulation	138
		miR-199a	Down regulation	138
Curcumin	MCF-7	miR-15a	Up regulation	139
		miR-16	Up regulation	139
DIM	MiaPaCa-2, Panc-1, and L3.6pl	miR-200b	Up regulation	140
		miR-200c	Up regulation	140
		let-7b	Up regulation	140
		let-7e	Up regulation	140
Isoflavones	MiaPaCa-2, Panc-1, and L3.6pl	miR-200b	Up regulation	140
		miR-200c	Up regulation	140
		let-7b	Up regulation	140
		let-7e	Up regulation	140
Genistein	PC-3	miR-221	Down regulation	141
		miR-222	Down regulation	141

(Continues)

TABLE 2 (Continued)

Dietary component	Cell line	MicroRNA	Expression in cancer	Citation
Resveratrol	LNCaP	miR-150	Up regulation	26
		miR-296-5p	Up regulation	142
		miR-7	Down regulation	142
		miR-17	Down regulation	142
		miR-20a	Down regulation	142
		miR-18b	Down regulation	142
		miR-20b	Down regulation	142
		miR-92b	Down regulation	142
		miR-106a	Down regulation	26
		miR106b	Down regulation	26
SCFA butyrate	HCT-116	miR-17	Down regulation	143
		miR-20a	Down regulation	143
		miR-20b	Down regulation	143
		miR-93	Down regulation	143
		miR-106a	Down regulation	143
		miR-106b	Down regulation	143
Oleic acid	HepG2	miR-21	Up regulation	144

EGFR signals such as MYC and K-Ras are important signaling pathways which are associated with modulating of a variety miRNAs such as miR-143 and miR-145 in cancer tumorigenesis.^{67,68} It has been showed that Western diet (known as a diet with high levels of animal fat and low levels of cholecalciferol and calcium) could induce colonic tumorigenesis via targeting EGFR signals.⁶⁹ It has been showed that Western diet via targeting EGFR could suppress miR-143 and miR-145 (known as tumor suppressor genes) which led to increasing colonic tumorigenesis and up-regulation of miRNA targets such as MYC and K-Ras.⁶⁷

It has been showed that Dietary folate could be associated with regulation of miRNA expression in different model systems and this could be related to the activity of folate in cancer prevention and risk. In a study, Marsit et al⁷⁰ indicated that deficiency of folate in growth media of human lymphoblastoid cells could induce significant changes expression levels of 24 miRNA such as miR-222. They showed that when folate was added back to the media, expression profiles of miRNAs returned to that of control cells. These findings suggested that folate and some dietary components could modulate expression of various miRNAs and deregulation of these miRNAs might be suitable biomarkers of nutritional status in humans as well as participants in cancer prevention.⁷⁰

Vitamin E is other dietary components which could regulate miRNA expression. In a study, Gaedicke et al⁷¹ indicated that utilization of diet with vitamin E deficiency

(α tocopherol, <1 mg/kg diet; γ tocopherol, <1 mg/kg diet) for 6 months than a vitamin E-sufficient diet (α tocopherol, 12 mg/kg diet; γ tocopherol, 24 mg/kg diet) could change miRNA expression in a rat model. They showed that vitamin E deficiency could lead to decreasing of hepatic miR-122a and miR-125b expression. These miRNAs could be involved in lipid metabolism, inflammation, and HCC. These results suggested that providing of a dietary regimen with appropriate vitamin E status could exert its prevention regulatory properties via regulating miRNA expression which involved in cancer prevention.⁷¹

MiR-21 is one of important targets of curcumin which could be involved in a wide range of cancer associated pathways.⁷² Deregulation of miR-21 is associated with initiation and progression of various cancers. It has been showed that curcumin exerts anti-cancer properties via down regulation of miR-21 in various types of cancer. It has been showed that miR-21 acts as one of important players in a variety of cancer associated processes such as proliferation, apoptosis, metastasis, and drug resistance.^{73–75,77} A large number studies confirmed that miR-21 exerts its pathological effects via affecting various downstream pathways including phosphatase and tensin homolog (PTEN)/phosphoinositide 3-kinase/protein kinase B (PI3K/Akt), programmed cell death protein 4 (PDCD4), and NF- κ B pathways.⁷⁵ Moreover, it has been showed that curcumin could affect on various cancers via affecting on exosomes containing miR-21 which has critical roles in progression of cancer.⁷⁶ Hence, miR-21 is one

of major targets of curcumin which curcumin and its analogs exert their therapeutic effect via modulating of it.

Multiple lines evidence indicated that dietary factors may have adverse effects on microRNA signaling and could induce various types tumor.⁷⁵ For example, some studies indicated that there are significant relation between melanoma incidence and BMI.^{78,79} Among of various cellular and molecular targets which involved in BMI, MiR-21 is one of important players in this area. It has been showed that miR-21 could be involved in adipocyte differentiation and up regulation of it could be associated with obesity in obese subjects.^{80–82} In the other hand, inhibition of miR-21 could be associated with reduction of obesity in db/db mice.⁸³ In a study, Pandey et al⁸⁴ indicated that HFD-induced obesity could be related with increasing of melanoma progression via targeting Cav-1 and FASN expression in tumors from HFD mice. Moreover, adipocytes could release exosomes containing various miRNAs which could affect on various pathways.^{85,86} These findings suggested that dietary miRNAs and dietary exosomes containing miRNAs may have critical roles in progression of various types of cancer.

1.4 | Dietary effects on exosomal microRNAs and their role in cancer prevention

Exosomes are known as nano vesicles with 50–100 nm in diameter. Exosomes consist of a lipid bilayer membrane and a variety of proteins.⁸⁷ Moreover, it has been showed that these nano-criers could carry a variety of molecules such as DNAs, small non-coding RNAs (ie, microRNAs) and various proteins.^{88,89} It has been showed that exosomes play critical roles in cell-to-cell communication. These vehicles via targeting their cargos could change behaviors recipient cells. Multiple lines evidence indicated that exosomes have important roles in initiation and progression of a variety of diseases such as cancer.^{88,89} These vehicles via targeting their cargos to recipient cells could lead to activation/inhibition of a sequence of cellular and molecular pathways involved in cancer.^{88,89} Recently, few studies indicated that dietary exosomes could be used as effective tools for cancer therapy. In a study, Ju et al³³ indicated that grape exosome-like nanoparticles (GELNs) could induce intestinal stem cells and protect mice from DSS-induced colitis.³³ They results indicated that GELNs are able to travel within the gut and migrate through the intestinal mucus. They could be taken up by mouse intestinal stem cells and could induce the proliferation of intestinal stem cells. These finding suggested that edible exosomes could be used as effective candidates for prevention and treatment of a variety of diseases.³³

One of important exosomes cargos are miRNAs. It has been showed that a variety of dietary components are able to modulate expression of miRNAs in various models.⁸⁷ These regulations could lead to decreasing of cancer risk. Hence, it

seems that dietary exosomes via introducing various cargos such as miRNAs could exert their therapeutic. It seems that future studies could open new windows in this area.

It has been showed that only viable cells are able to synthesize and release exosomes that could carry miRNAs to recipient cells. Dietary factors with nutrigenomic effects may modify the miRNA composition and content of cell-derived exosomes.^{64–66}

Recent efforts have been undertaken to use milk-derived exosomes for the encapsulation curcumin which could enhance curcumin transport and drug effects. These results suggested that using milk-derived exosomes containing curcumin could induce therapeutic effects of curcumin in the better way than using curcumin alone.⁹⁰

1.5 | Dietary exosomes and cancer promotion

Various types of cells such as somatic cells, immune cells, tumor cells, and mammary gland epithelial cells especially during lactation could release abundant exosomes for mRNA-, protein-, and miRNA-mediated cell-cell communication, which has favorable (breastfed infant) or adverse effects on human health.⁷⁵ Numerous studies indicated that bovine milk could provide various bioactive exosomal miRNAs.^{91,92} MiR-29b is one of exosomal miRNAs which could be absorbed by humans in biologically meaningful amounts. The uptake of this could be associated with increasing its systemic circulation and leads to alteration of gene expression of the milk consumer.^{93,94} It has been showed that almost 245 miRNAs could be presented in cow's milk. These miRNAs could affect on 11 000 human genes in the human.⁹⁴ Hence, Milk could be suggested as an epigenetic transfection system that could promote postnatal growth via transferring a variety of miRNAs involved in various cellular and molecular pathways.⁹³ Moreover, bovine miRNAs of cow's milk could be survived in various processing such as pasteurization, homogenization, and refrigerated storage for over 2 weeks.⁹⁵


Exosomal miR-21 is one of major miRNAs present in cow's milk.^{92,96} It has been showed that increasing of milk consumption could be associated with progression of hepatocellular carcinoma.⁹⁷ It has been showed that interleukin 6 (IL-6) is able to induces STAT3-dependent miR-21 transcription in hepatocellular carcinoma.⁹⁸ In a study, Michaëlsson et al⁹⁹ indicated that there are a positive correlation between milk intake and high levels of IL-6. The increasing of serum IL-6 levels has been related with a worse prognosis of melanoma.^{100,101} Milk exosomal miR-155 is other important molecules which could be involved in STAT3-mediated tumorigenesis.¹⁰² It has been showed that miR-155 could induce STAT3 expression via inhibition of cytokine signaling 1 (SOCS1) which is known as a target of miR-155.^{102,103} Up regulation of miR-21 and miR-155 could be related with progression of melanocytic lesions. Exosomal

TGF β is other proteins which could be transmitted by commercial milk.¹⁰⁴ It has been showed that TGF β signaling induces up regulation of miR-21 via stimulating the processing of primary transcripts of miR-21 (pri-miR-21) into precursor miR-21 (pre-miR-21) by the DROSHA complex.¹⁰⁵ Hence, milk exosomes could be associated with progression of cancer via targeting various miRNAs and proteins such as miR-21, miR-155, and TGF β .

2 | CONCLUSION

Dietary patterns are known as one of main risk factors for various cancers. It has observed that various dietary patterns such as meat (red meat, processed meat, fish, and processed fish) or sugary-diet pattern are associated with risk of various cancers. In addition, multiple lines evidences indicated that plant dietary patterns have many antioxidant and anti-inflammatory components such as vitamin E that may be suitable for prevention or treatment of various cancers. The effect of various dietary patterns for prevention or treatments of different cancer remains unclear yet. Hence, more studies for showing positive or negative roles of them in cancer prevention are still required to be done. Moreover, a large numbers studies indicated that dietary compounds, dietary microRNAs and dietary exosomes could have critical roles in cancer prevention and therapy. Dietary compounds including curcumin, greet tea components, carotenoids, minerals and vitamins could affect on a variety of cellular and molecular targets which are involved in cancer initiation and progression. Hence, it seems that the applying of them in various dietary patterns could be useful for cancer prevention and therapy.

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