Introduction

It is known that a remarkable increase in life expectancy and ageing population increase day by day [1]. During the lifespan, there are multiple factors influence the longevity including genotype, metabolism, physiology, sociodemographic and environmental factors, nutritional and lifestyle habits. A healthy lifestyle is fundamental in disease prevention and expanding longevity [2,3]. Nutrition during the life time has an effect on the health status. Healthy lifestyle is related with reduced chronic disease risk [4]. The prospective cohort study with Chinese women showed that healthy lifestyle factors such as lower central adiposity, physical activity, non-smoking, fruit and vegetable consumption related with total and cause specific mortality [5]. In addition, a multi-ethnic cohort study results indicated that chronic disease risk index was inversely associated with lifespan [6]. Thus, the studies of lifestyle factors and survival focused on the importance of healthy lifestyle behaviors such as diet quality, non-smoking, and physical activity to get long-term health benefits. The 10 years longitudinal SENECA Study is conducted with 70-75 years old 1091 men and 1109 women in 9 European countries and the results point that smoking, low diet quality and less physical activity is related with the survival. Unhealthy lifestyle includes smoking, low diet quality and less physical activity increased mortality risk three to four fold. While non-smoking and less physical activity increased the mortality risk and delayed breakdown of the health status, diet is not have obvious effect alone. Related with that the lifestyle habit constituents such as nutrition, physical activity and smoking can modify to be healthier could improve the quality of life by delay the morbidity [7-9]. Dietary pattern is the well known important context of a healthy lifestyle and affects mortality. In this paper it is aimed to review the relation between human dietary pattern and life quality-expectancy.

Dietary Pattern

The studies related with nutrition and life expectancy can generally classified into three types. The first type includes the nutrition related indicators and mortality data. Second type includes population risk rate to support effects of nutrition on morbidity and disease cause mortality. While first type established direct, second type established indirect relation between nutrition and life expectancy. Third type involves regional nutrition level and life expectancy analysis [10]. Dietary indexes, certain dietary patterns and dietary guidelines have been used for analysing dietary pattern and life expectancy relationship in many studies [11].

Diet Quality

Longer lifespan is associated with obesity, cardiovascular diseases (CVD), type II diabetes, cancer which are nutrition-related chronic diseases [12]. A Nurses Health cohort study showed that greater Alternative Healthy Eating Index-2010 and Alternate Mediterranean Diet scores in midlife related with healthy ageing [13]. Diet quality is one of the main part of life quality, thus related with longevity. The Diet Quality Index was developed to measure overall dietary patterns, predict chronic disease risk but also...
can used as a predictor of short-term mortality [14,15]. Another longitudinal study with 3328 old men (60-79 years), Healthy Diet Indicator (based on WHO dietary guidelines) and the Elderly Dietary Index (based on Mediterranean dietary pattern) indicated that high diet quality is associated with all-cause mortality [16]. In addition, the longitudinal British Diet and Nutrition Survey with 972 participants (aged ≥65 years) measured the diet quality with three index and while the Healthy Diet Score was not a predictor of mortality, the Recommended Food Score and the Mediterranean Diet Score were related with all-cause mortality [17]. Also, the Breast Cancer Detection Demonstration Project, a prospective cohort study results showed that low diet quality is related with increased mortality risk [18]. In addition, American Cancer Society Cancer Prevention Study II Nutrition Cohort study results indicate that diet quality was related with all cause and all circulatory disease mortality rates [15]. According to results of First National Health and Nutrition Examination Survey (NHANES)-I low dietary diversity significantly correlates with high mortality risk of both men and women [19]. Another prospective study in Sweden conducted with women, demonstrated that cancer mortality of women who consume high consumption of red meats, refined carbohydrates, sugars, foods involve high saturated and trans fat is higher than women who consume that foods low amount [20]. According to the 16-year follow-up Whitehall II cohort study results, to be avoided from fried and sweet food, processed and red meat, refined grains, and high-fat dairy products is associated with a higher odds of disease-free and highly functional elderly [21]. Also, the prospective study in Europe with 452,717 participants indicated that increased fiber is associated with lower total mortality rate, and as a fiber source cereals-vegetables have effects more than fruits [22].

**Mediterranean Diet**

The characteristics of Mediterranean diet is a high intake of vegetables, legumes, fruits, and cereals; a moderate to high intake of fish; high intake of unsaturated lipids, a low to moderate intake of dairy products, a low intake of meat; and a modest intake of wine. Several studies have reported inverse associations with Mediterranean diet and overall mortality [23]. Mediterranean diet was inversely associated with total mortality with 22,043 adults in Greece [24]. The findings of the HALE Project which was conducted between the years of 1988-2000 with 2339 healthy participants aged between 70-90 years indicated that a Mediterranean diet and healthy lifestyle lower all-causes and cause-specific mortality at least 50% [25]. Moreover, the European Prospective Investigation into Cancer and Nutrition (EPIC)-elderly prospective cohort study conducted with 74,607 participant aged <60 years at nine European countries found out the association between Mediterranean diet and lowering overall death rate [23]. Besides that, the cohort study conducted with Dutch women aged 60-69 years found out that a Healthy Traditional Dutch diet, more beneficial than Mediterranean diet for longevity [26]. The study with older Swedish participants showed that Mediterranean dietary patterns including whole grain cereals, foods rich in polyunsaturated fatty acids, and a limited amount of alcohol can increase the longevity in the elderly [27]. Also, it is known that moderate wine consumption, another characteristic of Mediterranean diet reduces CVD risk and extend lifespan related with its resveratrol content [28]. In addition, the 12 years follow up study which is conducted with young women aged 30-49 years in Sweden showed that Mediterranean dietary pattern reduces overall and cancer mortality [29]. Furthermore, the cohort EPIC-Spain with 40,622 participants demonstrated that olive oil is associated with 26% reduction of overall mortality and each 10 g increase of olive oil consumption decreased overall mortality 7% rates [30]. Besides that the National Institutes of Health diet and health study included 214 284 men and 166 012 women showed that mediterranean dietary pattern reduced overall, cancer and CVD mortality in United States [31]. The results of meta-analysis of 12 studies indicated that mediterranean diet significantly reduced overall mortality (9%), mortality from cardiovascular disease (9%) and cancer mortality (6%) [32].

**Vegetarian Diet**

The results of reviewed data of the six studies indicated that in four studies there was a relation between a very low meat intake and decreased risk of death and the findings from one cohort of healthy adults showed that long-term (≥2 decades) vegetarian diet can produce 3.6 years increase in life expectancy [33]. On the other hand, meat consumption was not associated with mortality according to results of NHANES III which was conducted with 17,611 participants between 1986-2010 [34]. Moreover, according to the position paper of American Dietetic Association a vegetarian diet is related with a lower risk of death ischemic heart disease and the evidence based level is grade I-good [35].

**Calorie Restriction**

This term defined as energy restriction without malnutrition. Since the first published research on calorie restriction and extended longevity in rats, many studies conducted with lifespan in a variety of species including yeast, flies, worms, fish, mice and rats. The calorie restriction studies on mice and rat indicated that delays ageing [36-38]. In addition, studies conducted with Rhesus monkeys as primates evolutionary closer to humans demonstrated that 30% calorie restricted diet reduces age-related and all-cause mortality [39]. The findings of long term epidemiological study with Okinawans indicated that low calorie intake, little weight gain with age, life-long low body mass index linked with low risk for age related disease mortality and extended lifespan [40]. Therefore, longest-lived people Okinawans live 4 year longer than Americans since their low calories and nutritionally dense traditional diet [41,42]. Moreover, longterm human studies data showed that several metabolic adaptations such as of insulin, insulin like growth factor-1 and interleukin-6, reduction of triiodothyronine level and body temperature, oxidative damage, natural genetic variants in nutrient sensing pathways and alterations in autonomic function reduce the risk of type 2 diabetes, hypertension, cardiovascular disease and cancer thus extend the life span [43-47]. Hence, different responses of organisms to dietary restriction need to
References


