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Negative Impact of addiction to soft drinkconsumptioncarbonated beverages and Sugar-sweetenedon bonedensity, oral health , increased risk of Osteoporosis and type 2 diabetes due: A Study around the regions of Sodnac, QB, Trianon and Pheonix from a non-consumer

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ABSTRACT: *Several scientific studies have demonstrated that regular consumption of Soft drinks, also referred to as carbonated drinks and sugar sweetened beverages have a negative impact on the human body namely the bone density,oral health , increases the risk for osteoporosis and type 2 diabetes. Regular consumption of Soft drinks is said to be an addiction of same order as alcohol and cigarettes consumption. Musculoskeletal diseases such as fractures pose a serious global burden of disease.Although the direct causes of fractures are accidental falls or hits, the fundamental causes are low bone density and excessive bone loss [1,2] . Unhealthy lifestyle behaviors are associated with fractures [3]. Diet is an important determinant of bone health. The role of calcium, dairy products and vitamin D in bone health has been widely reported [4,5]. Moreover, diets rich in fruits and vegetables provide high levels of trace elements and vitamins can increase bone density and reduce the risk of fractures [6]. While the role of protein on bone health is still inconclusive, studies on the overall dietary pattern and fracture have attracted attention [7].Osteoporosis defined as a disease in which the density of bone reduced then became greatly porous and fragile at the end stage of the disease. The consequences of the disease include back pain, repeated bone fractures and up normal posture as a result of weakening skeleton. Excessive presence of sweeteners leads to oral health problems and inbalance in glucose level of patients.*

KEYWORDS: ***Soft drinks, bone density, Osteoporosis, type 2 diabetes, oral health***

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I. INTRODUCTION

Musculoskeletal diseases such as fractures pose a serious global burden of disease.Although the direct causes of fractures are accidental falls or hits, the fundamental causes are low bone density and excessive bone loss [1,2] . Unhealthy lifestyle behaviors are associated with fractures [3]. Diet is an important determinant of bone health. The role of calcium, dairy products and vitamin D in bone health has been widely reported [4,5]. Moreover, diets rich in fruits and vegetables provide high levels of trace elements and vitamins can increase bone density and reduce the risk of fractures [6]. While the role of protein on bone health is still inconclusive, studies on the overall dietary pattern and fracture have attracted attention [7].Osteoporosis defined as a disease in which the density of bone reduced then became greatly porous and fragile at the end stage of the disease. The consequences of the disease include back pain, repeated bone fractures and up normal posture as a result of weakening skeleton. Some 20 years ago, a study published in the Journal of Bone and Mineral Research[25] found that cola-drinking rats had lower levels of calcium, higher levels of phosphorus, lower levels of vitamin D and higher levels of parathyroid hormone than water-drinking rats. They also had lower bone density in the femur (hip) bone.A 2006 study, published in the American Journal of Clinical Nutrition, assessed the amount of cola and non-cola carbonated beverages, both with and without sugar, consumed by 1,125 men and 1,413 women. The study followed participants for 25 years and then checked their bone mineral densities. The authors did not find an association between non-cola carbonated beverages and lower bone mineral density in either men or women. Nor did they find an association between cola consumption and lower bone density in men. However, women who drank cola sodas had significantly lower bone mineral density than those who didn't drink sodas, regardless of whether the sodas contained sugar or artificial sweeteners.Another American Journal of Clinical Nutrition study, published in 2014, followed more than 73,000 women between the ages of 30 and 55 for 30 years. At the end of the study, they found that the rate of hip fracture was 10 percent greater among women who drank more than 10 sodas (of all types) per week, compared to those who did not drink any sodas. The authors then compared women with the same body mass index who drank soda versus those who didn't. Here the authors found a significant correlation between soda intake and hip fractures. Women who drank five to 10 sodas per week had a 16 percent increased risk of hip fractures, and women who drank more than 10 sodas per

week had a 42 percent increased risk of hip fractures. The increased rates of hip fracture were seen in both caffeinated and non-caffeinated sodas, as well as colas and noncolas.Carbonated spring water is simply water with dissolved carbon dioxide gas, but that's not to say it isn't acidic. The pH level is between 3 and 4 – higher than sodas' roughly 2.5 pH – while water has a pH of 7. The acidity could potentially pose a problem, but a study published in the British Medical Journal in 2005 found no difference in markers for bone turnover between postmenopausal women who drank carbonated mineral water for eight weeks and postmenopausal women who drank plain mineral water.

II. LITERATURE REVIEW

Chen *et al*[8] conducted a detailed study on the negative impact of Soft drink consumption among Asians and Chinese communities.One of the important components of the modern diet is soft drinks. In recent years, the consumption of soft drinks in China has been on the rise, especially among young people [9]. The high consumption of soft drinks increases the risk of obesity, diabetes and other chronic non-communicable diseases (NCDs) [10]. Excessive consumption of soft drinks can also reduce the intake of healthy drinks such as milk, leading to a lower intake of trace elements such as calcium and magnesium, which can increase the risk of osteoporosis and fracture [11,12].Most of the existing studies on soft drinks consumption have focused on bone mineral density, (BMD) with few studies on fracture [13]. Several studies have focused on the effects of carbonated beverages on adolescent fractures [14]. Drinking large amounts of carbonated beverages during the development of adolescents may reduce the accumulation of bone minerals and increase the risk of future fractures [15]. A high content of phosphoric acid in soft drinks has been hypothesized to be one of the mechanisms linking soft drinks and fracture. Excessive intake of phosphoric acid changes calcium/phosphorus ratio and imbalance of not only the calcium and phosphorus ratio but also the acid-base in the body, resulting in decreased bone density and even osteoporosis and fractures [16,17,18].

Soft drinks consumption is positively associated with obesity risk. Obesity is a risk factor for fractures in specific bone sites and a prospective cohort study which involving 17 sites in 10 countries found that obesity is a risk factor for upper arm/shoulder and clavicle fractures [19,20]. However, no studies have assessed the association between soft drinks and fracture in the Chinese population. We aimed to use the China Health and Nutrition Survey (CHNS) to assess the prospective association between habitual soft drinks consumption and fracture risk in Chinese adults.Soft drinks consumption was directly associated with fracture after adjusting for potential confounding factors. There was a dose-response direct relationship between soft drinks consumption and fracture.

Despite the large number of studies on the association between soft drinks and non-communicable diseases, studies on soft drinks and fracture among adults are limited [21,22,23]. To the best of our knowledge, this is the first study on soft drinks and fracture in the Chinese population. Our finding of a direct association between soft drinks consumption and fracture is in line with the existing studies in the USA . In the Nurse Health Study, among postmenopausal women, each additional serving of total soda per day was associated with a 14% increased risk of hip fracture (RR: 1.14; 95% CI: 1.06, 1.23) . Another study which included 161,808 postmenopausal women found that modest increased risk of hip fracture was associated with high soda consumption. [24] In the cross-sectional study conducted in the USA, among women former college athletes, nonalcoholic carbonated beverage consumption had a odds ratio for fracture of 2.28 (95% CI 1.36, 3.84). Several cross-sectional studies conducted among children and adolescents also found a direct association between soft drinks and fracture.

III. DISCUSSION

Sugar-sweetened beverages (SSBs), defined as any consumable non-alcoholic water-based beverage containing significant amounts of free sugars [26,] are a primary source of sugar consumption [27], and the proportion of people consuming beverages as their major source of sugar is steadily increasing[28.] This increase in sugar intake through beverages and its potential adverse effects on public health are of major concern [29.] SSBs include non-diet soft drinks/sodas; flavored juice drinks; sports drinks; sweetened waters; coffee, tea, and milk with added sugars; energy drinks; and electrolyte replacement drinks [30]. Strong evidence that SSB consumption is causally associated with increased risk of developing health problems, such as weight gain and obesity, type 2 Diabetes Mellitus, tooth decay, and cardiovascular disease, has been reported . Accordingly, many research and policy efforts have focused on consumption of sugar-sweetened beverages due to their substantial contribution to total added sugar intake [31,32]. The 2020 strategic Plan from the American Heart Association (AHA) recommends no more than 360 kcal per week from SSBs. This recommendation is exceeded by over 80% of the population in the United States [33.]Bone metabolism is affected by a variety of environmental factors, especially dietary factors [34]. Given the increase in SSBs consumption over the past decade, many studies have been conducted to investigate the effect of SSBs consumption on bone health [35, 36.] Added sugar, phosphoric acid, caffeine, and the acidity of SSBs may all affect bone metabolism by disturbing calcium absorption and

homeostasis in the body and increasing calcium excretion through urine [37,38,39] .High consumption of SSBs may also affect bone metabolism when replacing milk, known to be beneficial to bone health [40.]Also over consumption of SSBs is likely to accompany low diet quality (e.g. excessive intake of fast-food and low vegetable consumption), which might consequently influence micronutrient and calcium intake [41.]

IV. CONCLUSION

Several mechanisms may explainthis papers findings on the direct association between consumption of soft drinks and fracture. Soft drink contributes to the dietary intake of phosphorus. High phosphorus but low calcium diet may stimulate parathyroid hormone and cause bone resorption [43]. A high intake of phosphorus may also reduce the renal activation of 25-hydroxyvitamin D and affects calcium homeostasis [44]. Certain ingredients in soft drinks can affect bones. Sugar and sodium in soft drinks can increase the loss of calcium [45,46.] Increased consumption of caffeinated beverages also increases the risk of fractures [47] and recurrent fractures [48]. It should be noted that tea is also a protective factor for fractures, increasing bone mineral density [49]. The tea drink prevalence is high in the Chinese population. In a Chinese prospective study of half a million people, drinking tea daily reduced the risk of hip fracture [50]. Another study conducted in Singapore showed that drinking four cups of coffee daily increased hip fracture risk [51] The comparison between soft drinks consumers with non-consumer is in a way comparing soft drinks and tea in the Chinese context.Another possible mechanism for the indirect effect of soft drinks on bone fractures is the mediating effect of obesity. It has been shown in many studies that the consumption of soft drinks increases the obesity risk [52]. Fat affects the regulation of bone and is involved in the bone active hormones metabolism [53,54] Increased fat content in muscle leads to more falls, which can increase the fracture risk in specific areas [55,56]. People with obesity lose their normal protective mechanisms and are more inclined to fall backward or sideways than forward [57,58.]Phthalates may also play a role in the association between soft drinks consumption and fracture. Phthalates are widely used to make bottles for soft drinks. In animal studies, female rats treated with phthalates showed significant dose-dependent fetal skeletal malformations and bone homeostasis imbalances (e.g., deformities, delayed ossification, and skeletal variants) [59]. It can affect the actin cytoskeleton in Py1a osteoblasts and inhibits the calcium signaling pathways which are involved in bone proliferation, bone remodeling, and osteoblastic proliferation [60,61,62.] A study conducted in South Korea found that phthalates are directly associated with low bone mass and osteoporosis in women, regardless of calcium intake or physical activity [63.]

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