ABSTRACT

As an important natural resource, traditional medicine and its pharmacological effects are receiving a serious attention worldwide during this decade. *Ziziphus jujuba* Mill. is a thorny Rhamnaceae plant that is commonly used in folk medicine with multiple medicinal properties and scavenging effect on free radicals. In the *in vitro* study the nutrient composition, antinutrients, phytochemical screening and antioxidant properties were evaluated in different parts of *Ziziphus Jujuba Mill.* viz., pulp, seed, peel and combination of pulp and seed (PS). In *in vivo* study with two phases, nutritional and biochemical status of selected hyperlipidemic subjects with reference to atherogenic risk were assessed in cross sectional study (phase 1). Moreover, in clinical trials the effect of *Ziziphus Jujuba Mill.* supplementation on blood lipid profile in dyslipidemic subjects was evaluated (phase 2). The analyzed nutrient composition of the dehydrated sample showed the highest protein and iron content in seed, higher amounts of total ash and phosphorus content in pulp, high amount of magnesium especially in pulp and seed. Manganese was not detected in Chinese jujuba while potassium was the most predominant mineral. All parts of jujuba were poor in contents of sodium, zinc and copper. The highest insoluble dietary fiber contents was found in the pulp, whereas, soluble dietary fiber in the PS was higher than pulp. Extract of pulp showed tannins and saponins were present only in the aqueous extract of the samples. Overall, maximum phytochemical constituents were identified in the aqueous extract of pulp and seed. Regarding to antioxidant components, pulp and raw peel showed the highest polyphenol content and pulp was a good source of glutathione. Maximum tannin content demonstrated in the raw and cooked peel. Pulp contained significantly higher amounts of ascorbic acid. Raw peel was rich in flavonoid content and maximum total saponin in methanolic extract. All extracts were found significantly greater than ascorbic acid value as a standard. On the whole, the results obtained from different extracts demonstrated that maximum reducing potency was found in the cold and hot aqueous extracts of raw peel. In the *In vivo* study phase 1, a total of 217 subjects (M=129 and F=88) aged between 25-69 years include type 2 diabetes mellitus with dyslipidemia and non-diabetic with dyslipidemia subjects were recruited from five health care centers. A structured questionnaire was used to elicit information on their personal information, family and disease history, anthropometric measures, body composition, blood parameters, health
habits and dietary pattern. Out of 217 subjects 8.8% were non-diabetic while 91.2% were diabetic. According to WHR classification, 98% of males and 99% of females were found with different degree of obesity. 91% males and 89% females were WHR, higher than Indian normal BMI value. Based on results weight value was a significant predictor of total cholesterol and BMI and MUAMC values were the best predictors of VLDL respectively. Prevalence of metabolic syndrome was found to be 24 % among the subjects (55.7% males and 44.2% females).

In phase 2 of study from among 217 subjects, 45 subjects were randomly divided into three groups for clinical trials. Two different supplements (capsule) namely PS (Pulp and Seed combined) and WF (Whole Fruit) were given to the subjects for 8 weeks. In Group 1, a randomized single blind clinical trial on non diabetes high cholesterol and high triglyceride significantly reduced triglyceride (p< 0.001), VLDL (p<0.001) and TG/HDL (p< 0.05) on PS supplement. In Group 2 a randomized, double blind clinical trial on diabetes high cholesterol and normal triglyceride, significantly (p<0.05) decreasing in cholesterol, systolic blood pressure and CHD risk was seen on WF supplement. In Group 3 a randomized, double blind clinical trial on diabetes high cholesterol and high triglyceride represented a significant reduction in cholesterol (p<0.01), LDL (p<0.01), Triglyceride (p<0.01), VLDL (p<0.05), TG/HDL (p<0.01), Non-HDL (p<0.05) and CHD risk (p<0.001) on WF supplement. Taken together, our findings indicate that *Ziziphus jujuba Mill.* is a good source of nutritional and antioxidant components. Our results suggest that *Ziziphus jujuba Mill.* decrease the serum lipid profile level and CHD risk factors in dyslipidemic subjects. Orally administration of jujuba supplements did not show any side effects on liver and kidney as assessed by biochemical measurements. Besides, *Ziziphus jujuba Mill.* may potentially be safe for use as an antilipidemic agent.