

Interest of association between acacia gum and proteins

Marketing inputs in North America

Proteins

The use of protein among global product launches tracked increased by +5.7% in the first semester of 2015, compared to the same period in 2014. The top category for tracked launches in the region is bakery (22%), with whey (65%) in different forms, being the most tracked protein ingredient, increasing in number of launches tracked (+4%). Other top protein sources have declined from 2014-H1 to 2015-H1, except for pea protein (+11%). Following no additives/preservatives (14%), high in protein was the second most tracked health claim (12%).

Fibers

New North American product launches tracked containing fibers demonstrated an 8% overall increase from H1 2014 to H1 2015. The top category for tracked launches utilizing fiber ingredients in the region was cereals (23%), with inulin being the leading fiber ingredient tracked. The fiber ingredients to demonstrate the most growth were resistant dextrin (+23%) and inulin (+23%).



This product representing the trend of fiber + proteins

High protein consumption and kidney's associated risks

As pinpointed by Friedman AN. in 2004¹, high-protein (HP) weight-loss diets have existed in the United States for decades, although their popularity has recently surged as obesity has become more common. Despite their widespread use, valid concerns exist that HP diets may induce clinically important alterations in renal function and health. HP consumption has been found, under various conditions, to lead to glomerular hyperfiltration and hyperemia; acceleration of chronic kidney disease (CKD); increased proteinuria; diuresis, natriuresis (sodium diuresis), and kaliuresis (potassium diuresis) with associated blood pressure changes; increased risk for nephrolithiasis; and various metabolic alterations. Unfortunately, a comprehensive understanding of the implications of HP diets is limited by the lack of a universally accepted definition for HP intake, a paucity of rigorous long-term human interventional studies that necessitate relying on short-term or fairly circumstantial evidence, and sparse data on the effects of HP consumption in obese individuals. In addition, matters are further complicated because the renal impact HP diets for limited periods is most likely different than that for more chronic consumption. Nevertheless, although there are no clear renal-related contraindications to HP diets in individuals with healthy kidney function, the theoretical risks should be reviewed carefully with the patient. In contrast, HP diets have the potential for significant harm in individuals with CKD and should be avoided if possible. Because CKD is often a silent disease, all individuals should undergo a screening serum creatinine measurement and urinary dipstick test for proteinuria before the initiation of such a diet.

More recently, the harmful effect of HP used as a slimming diet in obesity has been confirmed par Wyka et al 2015². Overweight and obesity are metabolic disorders affecting both adults and children. However, high protein diets are often chosen by obese persons for losing weight. Recently in Europe, the high-protein Dukan-diet, named of Dr Dukan that launched his own brand, has become very popular. Studies on healthy subjects eating high protein diets have been unable to show any disorders in glomerular filtration. Nevertheless, an increased excretion of calcium, urates and phosphates was observed which may lead to kidney stone formation. Excessive consumption of animal derived protein, being a rich source of purines, increases serum concentrations of uric acid that leads to hypertension and renal function disorders, like gout. The advantages of rapid weight loss of high protein diets needs to be reconciled with the potential health threats such as advancing renal and cardiovascular disease.

Coresh et al in 2005³ published an interesting epidemiologic study about the Chronic Kidney Diseases (CKD) prevalence in US adults from 1999 to 2000. The researchers concluded that the analysis of CKD within the most recent NHANES 1999 to 2000 indicates three remarkable features.

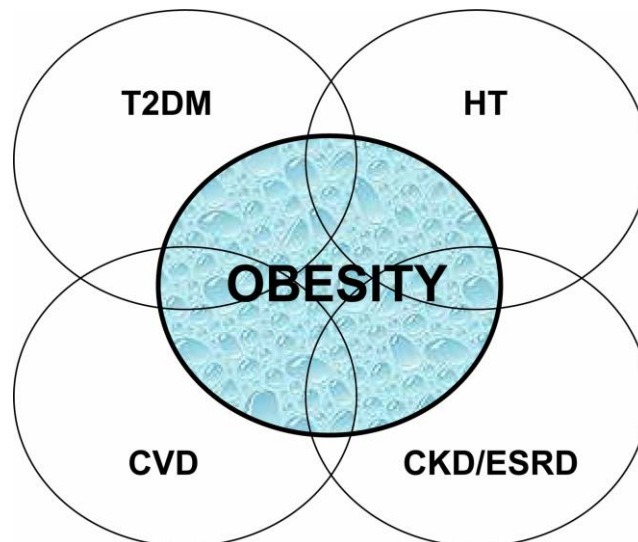
- First, the awareness of CKD is low and a disparity exists such that women are far less apt to be aware of having decreased kidney function than men.
- Second, although the burden of CKD is high, it has not increased substantially in nearly a decade since NHANES III, even though the incidence of End Stage Renal Disease (ESRD) has risen by 50% during that interval.
- Finally, whites and blacks share approximately the same prevalence of CKD overall despite the fourfold greater incidence of ESRD in blacks group.

Given the high prevalence of CKD, efforts to increase awareness, diagnosis, and treatment are needed to meet the Healthy People 2010 goal of reducing new cases of CKD and its complications, disability, death, and economic costs.

The results of the Coresh et al study confirmed a previous one conducted by Muntner et al and published in 2002⁴. This team studied the relationship between kidney diseases or renal insufficiency and cardiovascular disease. Cardiovascular disease-related and all-cause mortality rates were higher among the United States population with a reduced Glomerular Filtration Rate. Additionally, a graded relationship was observed between higher urinary protein levels and increased risks of subsequent cardiovascular disease related or all-cause-related death. These results are especially important because the analysis used a nationally representative cohort to address the National Kidney Foundation research recommendations for determination of the risks of cardiovascular disease and death among subjects with renal insufficiency and early renal disease. This study supports the additional research recommendations made by the National Kidney Foundation, including determination of the prevalence, incidence, and pathogenesis of cardiovascular disease among the population with renal insufficiency.

These studies show how consumption of protein, and especially in high amounts could be harmful for kidneys, and of course for people ignoring their "silent disease". High protein diet are used to treat obesity, for muscle anabolism, or as a new nutrition. But it seems that if it presents no risk for healthy people during acute consumption, what could be the effects on a long term chronic consumption? Hariharan et al 2015⁵ showed that the new western diet rich in protein, and poor in fibers plays a strong role in chronic diseases including chronic kidney diseases.

We all know that Obesity and Diabetes are huge health problems, becoming more and more serious, and that are related to the western diet and our way of life. These two health problem has been identified as contributors to the development and the progression of chronic kidney diseases, Maric-Bilkan C. 2013⁶.



Clustering of risk factors for obesity-related renal disease

Obesity, type 2 diabetes (T2DM), hypertension (HT) and cardiovascular disease (CVD) are all risk factors for chronic kidney disease (CKD) and end-stage renal disease (ESRD).

As illustrated by Maric-Bilkan C; in her paper, the presence of one or more of these risk factors multiplies the overall risk for disease development and progression.

So what could be the interest of consuming acacia fiber to counteract a high proteins consumption?

The kidney health benefits of acacia gum consumption

Of course, the demonstration of the interest of introducing acacia fiber to the diet with the aim of improving kidney health, has been carried out on renal failure subjects.

In 2008 Ali et al⁷ conducted a clinical trial on 36 patients suffering of chronic renal failure. The consumption of 50 g/day of Arabic gum during three consecutive months, led to the improvement of the kidney health status.

In 2007 Mosawi Al⁸. Reported the case of a young 11-year-old girl that during the 4 years of the study continued experiencing improved well-being and good participation in outdoor activities, had never been acidotic or experienced significant uremic symptoms by following a diet enrich with acacia gum. As he published in 2009⁹ the benefits of acacia gum consumption for this young patient sustained during two more years with no dialysis.

Gout, that is a health problem related to increased uric acid level, from proteins digestion, in the blood, consecutive to a too rich diet, could be treated by acacia gum. The consumption of 50g/day during 120 days ameliorated the health status of the subjects, Osman et al 2011¹⁰.

Earlier in 1996, Bliss et al¹¹, concluded from a clinical trial, that Chronic Renal Failure (CRF) patients consuming a Low Protein Diet (LPD) supplemented with 50 g gum Arabic/day had greater fecal bacterial masses, greater fecal nitrogen excretion, and lower serum urea nitrogen than they did when consuming the LPD alone or supplemented with 1 g pectin/d. Because elevated concentrations of serum urea nitrogen have been associated with adverse clinical symptoms of CRF, the results suggest that gum Arabic may be a useful adjunct to an LPD for increasing excretion of nitrogenous wastes in feces. The results encourage further investigation of whether supplementation with dietary fiber may be beneficial in delaying or treating the symptoms of CRF without adversely affecting nutritional status or in permitting greater protein intake for CRF patients without being detrimental to renal function.

The ability of the acacia gum to promote urea excretion, has been confirmed recently by studying the fermentation patterns of this fiber using an in vitro device (SHIME-not published data).

In 2002 Jonassen et al¹² exposed in their article the role of LipoPolysaccharides (LPS) in the development of renal failure. They also described how acute renal failure is a frequent complication to the systemic inflammatory response syndrome, associated with an inflammatory host response to endotoxins released from infectious agents characterized by massive production of cell-derived mediators such as tumor necrosis factor (TNF)- α , interleukins (IL-1 β and IL-8). The anti-inflammatory property of the acacia gum against these cytokines has been recently assessed in an in vitro experiment dealing with the demonstration of the ability of the acacia gum to improve the leaky gut syndrome, Daguet et al 2015¹³, Daguet et al 2015¹⁴. It is important to notice that gut permeability has been identified as an important factor in the onset of renal failure. As pointed by Jonassen et al, inflammation is a major mediator of chronic kidney disease progression. But also, altered gut microbes and disruption of the intestinal barrier are involved in these diseases by permitting influx of urea and metabolic alterations of uremia, which enhance growth of pathogens (dysbiosis) in the gut and increase translocation of living bacteria and bacterial components (Anders et al 2013¹⁵, Vaziri et al 2014¹⁶).

Another interesting property that has been confirmed by our recent experiments (Daguet et al 2015), is that acacia gum is a butyrogenic fiber. This feature has to be related with a previous experiment carried out by Matsumoto and his team in 2005¹⁷ that showed how

butyrate is involved in kidney's health. In conclusion, their data supported the hypothesis that dietary supplementation with acacia gum by increasing systemic levels of butyrate, may have a potential beneficial effect in renal disease by suppression of TGF- β 1 activity.

Summary and hypothesis

The kidneys health benefits of acacia gum consumption can be explained by its ability to promote a better renal function as expressed by the urea excretion. But also by its anti-inflammatory properties on specific cytokines like TGF- β 1 and interleukins.

We could also hypothesize that the butyrogenic nature and the ability of the acacia gum to improve the gut impermeability are key factors to explain the health benefit activity of these fiber on renal functions.

Conclusion

High proteins consumption could be associated to a risk of silent renal failure development for healthy people, and more seriously for obese, type 2 diabetics and hypertensive, that could be interested in eating more proteins.

Acacia gum demonstrated some interesting and some innovative properties in the reduction of high protein diet side effects on renal function.

Hence, acacia gum may represent a helpful solution for a more wholesome consumption of high amounts of proteins. For healthy people, obese, diabetics, hypertensive but also for people suffering of renal failure.

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