



# Therapeutic Effect of Barley Grains powder (*Hordeum vulgare L.*) Among Sudanese Patients with Proteinuria Admitted at Ibn Sina Hospital in Khartoum State - Pilot study 2018

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## Abstract

**Background:** Proteinuria is very common in Glomerular diseases like membranous glomerulonephritis, focal segmental glomerulonephritis and minimal change disease. Severe proteinuria can cause nephrotic syndrome in which there is worsening swelling of the body. Barley grains were used to treat the proteinuria but not been recommended formally to be used.

**Objectives:** This study aimed to determine the effect of Barley grains powder (*Hordeumvulgare L.*) among Sudanese patients with Proteinuria admitted at Ibn Sina hospital in Khartoum state.

**Methods:** This is an analytical, cross-sectional hospital based study performed in Ibn Sina hospital in Khartoum state capital of Sudan during 2018-2019 in Sudanese patients above of age range (20 - 80 years old) who have documented renal impairment with significant proteinuria and have no extra renal cause of proteinuria. The patients were given barley for one week. In a dose of full tea glass of barely in three tea glasses of water (one tea glass equal 750 ml of water and 50 mg of barely). 24 hour's urine and Blood samples for each patient was collected before and after barley administration and then the samples were sent to the laboratories for urinary protein estimation, serum albumin and renal functions test.

**Results:** The mean of urinary proteins before the barley administration was found to be 300.1389 mg/dl SD while the mean after barley administration was 248.74. With regards to 24 hours urine proteins; before intervention the mean was found to be 3.3934 g/day while the mean after intervention was 2.6433 g/day with significant p value (0.016). The level of serum albumin was found to be higher after administration of Barley with mean (2.6083 g/dl) compared to the mean after intervention (3.0500 g/dl) with significant p value 0.031.

**Conclusion:** Barley was found to be effective therapy for treatment of patients with proteinuria

**Keywords:** Barley; Proteinuria; Sudan

## Introduction

A. Barley (*Hordeumvulgare L.*) is the world's fourth most important cereal crop after wheat, rice and maize [1]. It is readily available with reasonable cost and has the highest amount of

dietary fiber among the cereals which may be beneficial for the metabolic syndrome. Numerous studies showed that whole grains containing a high amount of soluble fiber, such as oats,

are more effective in lowering blood cholesterol than grains containing predominantly insoluble fibers, such as wheat or rice [2,3].

B. The US Food and Drug Administration Allows the health claim statement that, depending on the  $\beta$ -glucan content, consumption of soluble fiber from oats or psyllium in a diet low in saturated fat and cholesterol may reduce the risk of Coronary Vascular Disease (CVD) [4].

C. Proteinuria is presence of even relatively small amounts of protein or albumin in the urine is an important early sign of kidney disease and is a strong predictor of an increased risk for cardiovascular mortality and morbidity in certain high-risk groups within the general population [5].

D. The possibility that proteinuria may accelerate kidney disease progression to end-stage renal failure has received support from the results of increasing numbers of experimental and clinical studies. Evidence indicating that this process occurs through multiple pathways, including induction of tubular chemokine expression and complement activation that lead to inflammatory cell infiltration in the interstition and sustained fibro genesis is reviewed [6].

E. Proteinuria is not only a well-recognized sign of kidney disease, but it is also an independent risk factor for the progression of renal failure. Understanding the underlying mechanisms and structural changes leading to a leaky glomerular 'barrier' is therefore of outmost importance. In the kidney glomeruli some 180 L of primary urine are filtered daily from the plasma, with almost total exclusion of plasma proteins of the size of albumin and larger. Morphologically the filtration barrier consists of three layers: (a) the fenestrated endothelium, (b) the glomerular basement membrane (GBM) and (c) the podocytes (epithelial cells) with their interdigitating foot processes that are separated by an ultrathin slit diaphragm. The main macromolecular barrier function was previously assigned to the GBM, but studies carried out during the last few years have led to new findings showing that the podocytes and their slit diaphragms actually have a central role in retaining plasma proteins in the circulation [7].

F. Effect of Barley on lipids Long-term feeding studies incorporating  $\beta$ -glucan have shown reductions in plasma cholesterol in hypercholesterolemia men [4,8]. A diet low in saturated fat and high in viscous polysaccharides, including  $\beta$ -glucan, resulted in a 7.5% reduction of serum cholesterol in hyperlipidemia men and affect other parameters of lipid profile [9-13].

G. Barley leaves have also a high antioxidant activity that might be useful in metabolic syndrome prevention or therapy,

as well as diseases caused by oxidative stress damage. This property is mainly attributed to saponarin, a flavonoid with potent antioxidant activity found in young green barley leaves [11].

H. Barley is a rich source of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including those involved in glucose metabolism and insulin secretion. Barley is also a very good source of fibers and selenium and a good source of phosphorus and copper [14].

I. It was found that constant consumption of whole grains decreased the risk of type II diabetes by 31%, pointing out that whole grains extend special benefits in motivating healthy blood sugar control [12]. According to Nilsson and coworkers, eating whole grain barley by human can regulate blood sugar for up to 10 h after consumption [15]. What seems to have been responsible for barley's effectiveness in regulating blood glucose is probably its soluble fiber content [16].

J. Barley has been found to be a kidney-friendly and diabetes-friendly food. It can help control diabetes and kidney damages so as to help reduce high Creatinine levels to a certain degree. The study aimed to investigate the potential therapeutic effect of barley on Sudanese adult patients with proteinuria admitted at Ibn Sina hospital in Khartoum State.

## Materials and Methods

a. This was an analytical, cross-sectional hospital-based study performed at Ibn Sina hospital in Khartoum state capital of Sudan during 2018-2019 in Sudanese patients documented to had renal impairment with significant proteinuria and have no extra renal cause.

b. The patients who agreed to participate in the study were interviewed. The objectives of the study were explained to all individuals participating in the study. Written consent was being obtained from all participants after fully explaining to them the project.

c. An interview questionnaire was be filled by all volunteers to obtain the data about age, address, occupation ,level of education , medical history, family history , history of NSAIDs and any other drugs use, marital status, smoking, lifestyle, Weight, height, BMI and blood pressure, was measured with standard techniques. All techniques and equipment were standardized and performed twice (before and following barley administration).

d. The sample was then convenient sample. The patients were given barley for one week. In a dose of full tea glass of barely in three tea glasses of water (one tea glass equal 750 ml of water and 50 mg of barely).

e. 24 hour's urine sample for each patient was collected before and after barley administration and then the samples were sent to the laboratories for protein estimation. Measurement of a 24 hour urine sample was done by colorimetric method. All study participants were provided a conventional 24-hour urine container. For each study participant; two separate urine collections were obtained. The first sample was taken with conventional 24-hour urine collection instructions. For the first sampling participants were asked to start urine collection at 9 o'clock in the morning, after discarding first morning urine. After that, entire volume of urine throughout the day collected in the container to determine volume, and protein levels. Urine protein levels were determined with the turbidimetric method with the aid of benzethonium chloride.

f. Five ml of venous Blood sample was collected in EDTA container for measurement of serum albumin and renal functions test. Measurement of serum Creatinine was done by biosystem 350 and mindary BS -200 using Jaffe's reaction (normal range: serum Creatinine 0.1-1.5mg/dl). Measurement of urea was done by colorimetric method using end-point determination Urease - Berthelot Reaction (normal range: urea=15-40mg/dl).

g. The study was approved by the research ethics committee of the Faculty of Medicine, The National Ribat University and ethical approval was taken from Ibn Sina Hospital.

h. The collected data was analyzed using SPSS (Statistical Package for Social Sciences), Version 25, (T-test for mean and P value for significance). P value ≤ 0.05 will be statistically significant.

**Results**

A. The study covered twenty Sudanese adult patients admitted at Ibn Sina hospital in Khartoum state. The patients were known to be suffering from proteinuria [16]. of

participants were males and [4] were females and their age were ranging between (20-80) years old. 20% of them were between (20 and 40) years old, 65% of them were between (40 and 60) years and the other 15% were between (60 and 80) years.

B. 80% [16] of the patients were males and 20% [4] were females.

C. In the majority of patients, the renal problems that caused the proteinuria was nephrotic syndrome such as membranous glomerulonephritis, focal segmental glomerulonephritis and minimal change disease.

D. There was a positive family history of diabetes and hypertension in 65% and 35% of patients respectively.

E. In regard to BMI among the group the majority were found to be within the normal category while 10% were under weight and only 5% were obese.

F. The mean of urinary proteins before intervention was found to be 300.1389 mg/dl SD while the mean after intervention was 248.74 (Figure 1).

G. With regards to 24 hours urine proteins; before intervention the mean was found to be 3.3934 g/day while the mean after intervention was 2.6433 g/day with significant p value (0.016) (Figure 2).

H. When protein is evaluated by number of crosses it was found that the average before intervention was 2.9 crosses while after intervention was 1.9 (similarly significant to the result of mg/ dl).

I. The level of serum albumin was found to be higher after administration of Barley with mean (2.6083 g/dl) compared to the mean after intervention (3.0500 g/dl) with significant p value 0.031 (Table 1).

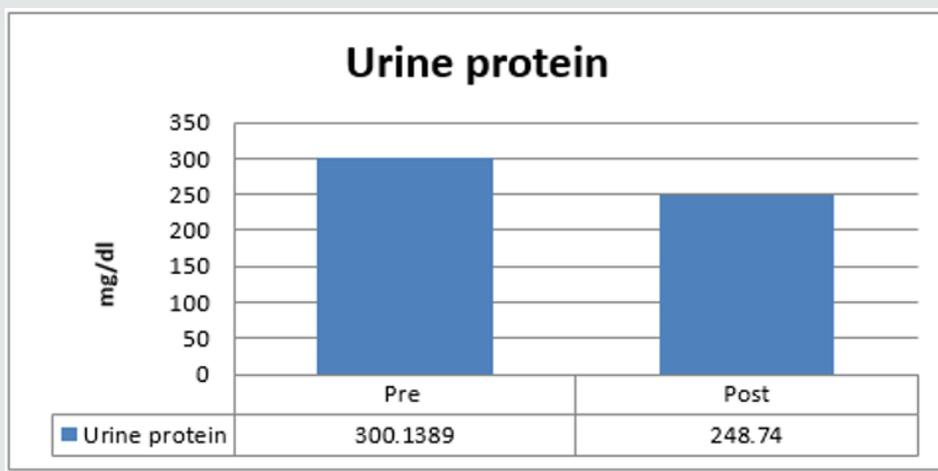


Figure 1: comparison between urine protein (mg/ dl) pre and post administration of barley.

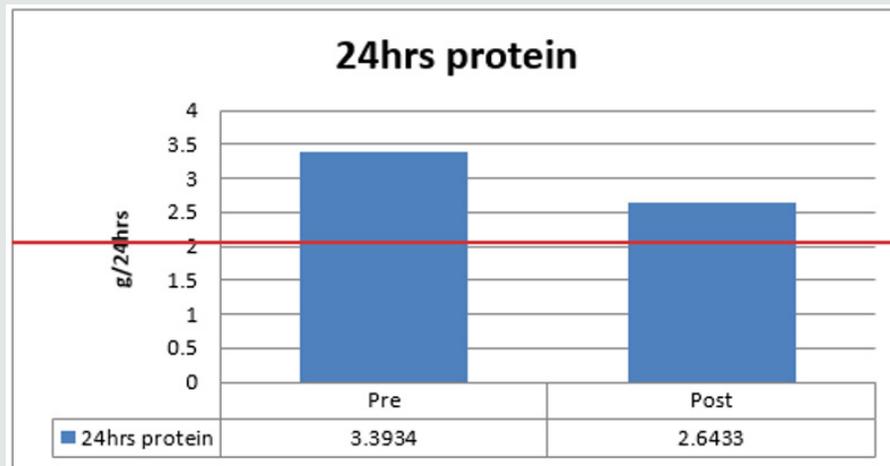


Figure 1: Shows 24 hours urine protein (g/ day) pre and post administration of barley.

Table 1: Tests Correlations (Paired Samples Statistics) pre and post barley administration.

Test		Mean	Std. Deviation	P.value
24 hrs. urine protein (g/24hrs)	Pre	3.3934	2.18989	.016
	Post	2.6433	1.74041	
Protein +++	Pre	3.0000	.60302	.053
	Post	1.9167	.79296	
Protein in urine(mg/dl)	Pre	300.1389	215.30183	.001
	Post	239.6000	192.53540	
Serum Albumin	Pre	2.6083	1.18049	.031
	Post	3.0500	1.32602	

- T-test p-value less than 0.05 is considered statistically significant.
- T-test p-value more than 0.05 is considered statistically insignificant.

**Discussion**

- A. This study aimed to know the effect of Barley on protein in urine where we found the use of Barley for a weak working on the decrease of protein in the urine. There is no similar previous data studying the effect of barley on proteinuria.
- B. We found most of the Patients (65%) suffering from proteinuria between the ages of 20-40 and the numbers of men were four times that of woman.
- C. Regardless to causation, the association between administration of barley and reduction in proteinuria was significant P value (0.016) but it was not accompanied by significant change in urine volume (insignificant P value 0.90).
- D. This may raise the question the need for further study to confirm the effect of barley in reduction of protein in the urine. The study also showed a positive effect in all age group. So, these indicate barley could be safely administered to all age.
- E. With regard to gender; male showed significant response than female. This also raised a question of the relationship of

gender response in association with barley administration specially a lack of literature in this issue.

**Conclusion**

Admission of barely to patients with renal disease is found to be associated with reduction of protein in urine as well as increase in serum albumin.

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