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Original Research Article

A Prospective Investigation of Low-Dose Aspirin Treatment and Renal Function in the Geriatric Patients

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Abstract

Aim: The aim of this study to evaluate the low dose aspirin therapy and renal function in elderly patients

Methods: This prospective study was carried out in the Department of General medicine, ICARE Institute of Medical Sciences and Research And Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for 1 year. This study employed a cohort of 50 elderly patients (age 60 years) and was comprised of 30 male and 20 female patients at the commencement of the study. The United Nations definition of an elderly person was used.

Results: A total of 50 participated in this preliminary study. There were 20 (40%) females and 30 (60%) males with age range between 50–80 years and mean ages of 59.88 years (±7.16) and 65.77 years (±10.09) for males and females, respectively. 21 (42%) of the patients had more than one diagnosis. Systemic hypertension was the most common diagnosis, accounting for 31 (62%) of cases. Hypertension and diabetes mellitus coexisted in seven (24%) of the study participants. 88% exhibited their basal renal function in stages 1 and 2 based on CrCl. The P-value for all these weekly parameters did not show statistical significance except for the CrCl (P = 0.021). The CrCl reduced at week 2, and then increased at week 3, pleateauing before gradually returning to baseline at the sixth week. The mean hemoglobin was 12.7 ± 5.7 g/dL with a range of 7.7–15.7 g/Dl.

Conclusion: This study did not show any deleterious effects of short-term, low dose aspirin (75 mg) use on the renal function of elderly patients. This 6-week study was cumbersome for most of the patients, and this precluded the participation of a lot of eligible geriatric patients.

Keywords: renal function, aspirin, geriatric patients

Introduction

Cardiovascular disease (CVD) is the leading cause of death and disease burden in China and worldwide. [1,2] Low-dose aspirin is the cornerstone of secondary prevention of ASCVD. However, some researchers discovered that low-dose aspirin could raise

SUA by a decrease in uric acid excretion, causing hyperuricemia which is a common clinical condition that can be defined as SUA level>420umol/l (7mg/dL) in male or>360umol/l (6mg/dL) in female. [3] Numerous evidence [4-6] have suggested the existence of an association between elevated SUA and CVD, traditional cardiovascular risk factors, metabolic syndrome, insulin resistance, chronic kidney disease and heart failure. [7–9] Hyperuricemia is an independent predictor not only of all-cause and cardiovascular mortality, but also of myocardial infarction, stroke and heart failure [10] and it may act as a promoter of renal damage for correlating with lower renal glomerular filtration rate and macroalbuminuria. [11] But there are few studies focusing on the effects of low-dose aspirin treatment for a longer time (used to be no more than 2 weeks) on uric acid and its urinary excretion among Chinese elderly patients. Aspirin, also known as acetylsalicylic acid (ASA), is a medication used to treat pain, fever, or inflammation. Specific inflammatory conditions in which aspirin is used include Kawasaki disease, pericarditis, and rheumatic fever. Aspirin given shortly after a heart attack decreases the risk of death. Aspirin is also used long-term to help prevent heart attacks, ischaemic strokes, and blood clots, in people at high risk. Aspirin may also decrease the risk of certain types of cancer, particularly colorectal cancer. For pain or fever, effects typically begin within 30 minutes. Aspirin is a nonsteroidal anti-inflammatory drug (NSAID) and works similar to other NSAIDs but also suppresses the normal functioning of platelets. [12] Common side effects include an upset stomach. More significant side effects include stomach ulcers, stomach bleeding, and worsening asthma. Bleeding risk is greater among those who are older, drink alcohol, take other NSAIDs, or are on blood thinners. Aspirin is not recommended in the last part of pregnancy. It is not generally recommended in children with infections because of the risk of Reye's syndrome. High doses may result in ringing in the ears.[12]

Material and methods

This prospective study was carried out in the Department of General medicine, ICARE Institute of Medical Sciences and Research And Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India.

For 1 year.This study employed a cohort of 50 elderly patients (age 60 years) and was comprised of 30 male and 20 female patients at the commencement of the study. The United Nations definition of an elderly person was used. [13]

Inclusion and exclusion criteria

The patients were those enrolled in long-term care, as well as new patients with various medical conditions necessitating the use of low dose aspirin that were in stable clinical conditions throughout the study. Each patient was followed up for a period of 6 weeks with a weekly clinic appointment. Excluded from the study were patients with a history of active peptic ulcer, gastrointestinal bleeding, chronic liver diseases, hyperuricemia, serum creatinine.

Methodology

Patients were put on moderate protein intake (0.6–0.8/kg of body weight) with the assistance of dieticians a week prior to the commencement of the study; this was maintained throughout the 6-week study. The status quo was maintained for all other drugs (dosages unchanged), including diuretics. Patients who dropped out of the study were included in the calculations until their exit. Blood and 24-hour urine were collected before the first dose of aspirin. Aspirin at a dose of 75 mg/day was administered orally after breakfast for 2 weeks and then stopped.

Follow-up then continued for a further 4 weeks. Blood and 24-hour urine were collected at the end of each treatment week,

as well as after each of the four consecutive week's follow-up visits.

Sample collection

Subjects were taught how to collect their 24-hour urine prior to their clinic day when the blood would be collected. After an overnight fast, 10 mL of venous blood was collected at the ante cubital fossa in the sitting position without stasis; 5 mL of the blood was put into lithium heparinized bottle, and the remaining 5 mL were put into a plain bottle. Serum was obtained after clotting, centrifuged at 3500 rpm for 10 minutes, and immediately stored at −20°C until they were analyzed. Sodium and potassium were analyzed using flame emission photometry, bicarbonate by method of back titration, and chloride by rapid precision method. [14] Serum creatinine, blood urea nitrogen, uric acid, and albumin were analyzed by standard methods of Jaffes reaction, [15] modified Berthelot, [16] enzymatic urease, [17] and bromocresol green, [18] respectively, using the Humalyzer 2000 Chemistry Analyzer. Urinary CrCl and uric acid clearance were evaluated by 24-hour urine collection for CrCl and uric acid clearances. The small sample size is a limitation of this study.

Statistical analysis

Each patient's baseline samples at enrolment (before commencing aspirin) served as the control, and subsequent weekly samples were compared. The weekly mean of the samples was calculated, and the difference of means from the baseline mean were determined and compared for statistical significance (P # 0.05) using the Statistical Package for the Social Sciences version 21.0 software (SPSS Inc, Chicago, IL, USA)

Results

A total of 50 participated in this preliminary study. There were 20 (40%) females and 30 (60%) males with age range between 50–80 years and mean ages of 59.88 years (±7.16) and 65.77 years (±10.09) for males and females, respectively. Table 1 shows the clinical data of the patients.

21 (42%) of the patients had more than one diagnosis. Systemic hypertension was the most common diagnosis, accounting for 31 (62%) of cases. Hypertension and diabetes mellitus coexisted in seven (24%) of the study participants.

Table 2 shows the stages of renal function based on the National Kidney Function/DOQI guideline: 88% exhibited their basal renal function in stages 1 and 2 based on CrCl. The P-value for all these weekly parameters did not show statistical significance except for the CrCl (P = 0.021). The CrCl reduced at week 2, and then increased at week 3, pleateauing before gradually returning to baseline at the sixth week. The mean hemoglobin was 12.7 ± 5.7 g/dL with a range of 7.7–15.7 g/dL.

Table 1: Clinical data

	Number of patients	**%**
Diagnosis*		
Systemic hypertension	31	62
Congestive cardiac failure	6	12
Diabetes mellitus	12	24
Peripheral artery disease	8	16
Carotid aneurysm	2	4
Ischemic cardiovascular disease	3	6
Obesity	3	6
Parkinson's disease	2	4
Background COPD	5	10

Drugs**		
Diuretics	47	94
Antibenign prostatic hypertrophy (and receptor blocker)	2	4
Antihypertensives		
Excluding thiazides and angiotensin converting enzyme inhibitors	28	56
Digoxin	3	6
Oral hypoglycemic agents	8	16
Insulin	3	6
Angiotensin converting enzyme inhibitors	21	42

Notes: *Some patients had multiple diagnoses; **all the patients were on multiple drugs.

Table 2: NKF/DOQI classification of patients in this study

Stage	**GFR (mL/min)**	**CrCl (%)**
1	90	28 (56)
2	60–89	16 (32)
3	30–59	6 (12)
4	15–29	–
5	>15	–

Discussion

This study did not show any significant deterioration effects in renal function in the geriatric patients studied, during or after a 2-week administration of low dose (75 mg) aspirin in all of the investigated parameters. This is not in accordance with previously published. [19-21] Previous studies have shown that low dose aspirin (75–325 mg) in the elderly, even on a short-term basis, had significant effects on renal tubular function.19-21 Furthermore aspirin (75 mg) per day, administered for 1 week, the uric acid clearance and CrCl reduced. Only the uric acid clearance returned to the baseline 1 week after the discontinuation of aspirin. [19]

The disparity from previous studies noticed in this study may be due to the better baseline renal functions of our patients.

As shown in Table 2, more than 88% of the study subjects had their basal renal function (CrCl, 88%) in stages 1 and 2 of the American National Kidney Foundation criteria, whereas only about 50% (CrCl, 57%) of the patients in the Segal et al21 study had theirs in the later stages.

There were 20 (40%) females and 30 (60%) males with age range between 50–80 years and mean ages of 59.88 years (±7.16) and 65.77 years (±10.09) for males and females, respectively. Previous studies used older patients with a mean age of 80 ± 9 years, [21] and an average age of 81 years.20 Of note, renal functions depreciate with age; [22,23] hence, the basal renal functions of the patients in this study were better than those of other studies. This might have attenuated the renal effects of low dose aspirin.

Only 3 (6%) of the patients in this study were anemic. This is in keeping with the stage of their renal functions. Anemia in chronic kidney disease becomes pro- gressively pronounced from stage 3 onward. [24] Similarly, only 23 (46%) of the patients had hypoalbuminemia.

Previous studies have shown that hypoalbuminemia and anemia potentiate the deleterious effects of low dose aspirin on renal function. [19-21] This current study did not conform to this. This may be due to the very small number of our study patients having either hypoalbuminemia or anemia.

Previous studies have also shown significantly lower CrCl on a concomitant low dose aspirin–diuretic combination. [25,26] Our finding differs from this observation, as 88% of the patients in this study were on this combination, yet there was no significant lowering of the CrCl. we observed positive statistical significance (*P* □ 0.021) in the CrCl parameter. [27] The CrCl at week 2 reduced and increased by the third week, plateauing before gradually returning to baseline at the sixth week. We are of the opinion that the multiple drugs aimed at ameliorating the various comorbid conditions in the patients of our study might have acted in synergy with the low dose aspirin to give this favorable increase in CrCl during the study. A larger sample with the application of more advanced statistics is advocated in order to provide a more concrete explanation for this observation. The small sample size is a limitation of this study. The decision to put an elderly patient on low dose aspirin should be based on the basal renal functions and the age of the patient. Caution should be exercised when dealing with those in renal stages 3–5, and when dealing with the very elderly (age 80 years). We also suggest that the 75 mg dose of aspirin should be retained as the antiplatelet of choice in the elderly in developing countries.

Conclusion

This study did not show any deleterious effects of short-term, low dose aspirin (75 mg) use on the renal function of elderly patients. This 6-week study was cumbersome for most of the patients, and this precluded the participation of a lot of eligible geriatric patients. The small sample size combined with the tasking nature of the study that was conducted in a peculiar setting might have affected the results. We suggest that more studies be conducted in our own environment with a larger sample size, and possibly in a center with a predominant geriatric population.

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