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ABSTRACT

Aloe Vera is used both packaged and traditionally commercially in earth numerous regions of the for many cosmetic and soothing purposes. The present study was carried out to observe the protective effect of Aloevera plant on aluminium fluoride induced deterioration changes in kidney of albino rats. Aloevera is herbal/medicinal plant attached to the family liliaceae which has a large range of curative applications such as curing ulcers; wound healing, burns, diabetes for easing intestinal, arthritic swellings and curing. Aluminium fluoride is toxic metals are universally found in environment human and animals are exposed to them by water, food, soil and contaminated Al (Aluminium) attachments to this group of harmful (toxic) metals. It is the 3 most familiar element in the world's crust and is everywhere in the environment yet, its biochemical and biological functions still remaining unknown. The target tissues for Al burden are brain, bone, kidney and liver symptoms and signs include dementia, esophagitis, colic, gastro enteritis, liver and kidney damage. Fluoride (F) toxicity is most serious health issue in human being and animals (rats). The drinking water restrains more than 1-1.5ppm of F. Fluoride is quickly absorbed from the by the gastrointestinal tract after oral administration. Exposure of fluoride in big and small amount for small time and for long duration causes toxic effects in some target objective organs like kidney, liver, blood and others organs. This study focused on estimation of the safety of Aloevera on kidney parameters-creatinine, uric acid, urea, sodium, potassium and BUN (blood urea nitrogen). Sixty albino rats were randomly and equally divided into three groups for 30 and 60 days consecutively. The first group served as control group for the experiment and second group treated with aluminium fluoride (200mg/kg b.w.) and third group treated with AlF3 along with Aloevera (300mgg/kg b.w.). Blood samples were collected on day 31st and 61stto determined changes in the kidney function for toxicity. Above parameters significantly increased treated with AlF3. The outcomes of this study suggested that Aloevera was effective in shorting AlF3 toxicity in kidney. Hence, Aloevera gel and its active compound (aloin) can be used as adjuvant therapy for the curative roll of Aluminium fluoride induced renal damage.

Keywords: *Kidney, Aloevera, Aluminium fluoride, Albino rat and Biochemical parameters*

INTRODUCTION

A variety of herbal/medicinal plants products have been utilized for enhancement and medical care of a broad range of diseases. Aloevera (Aloe barbadensis Linn.) belongs to family liliaceae was use from time ancient to treatment of kidney related disorders. A. Vera has been utilized widespread both for cosmetic, industries, medial purpose and food because of plentitude of medicinal pursuits of few metabolites. A. Vera leaf has many curable properties-like anti-inflammatory, anti-tumor, anti-bacterial, anti-arthritic, anti-ulcer and hypoglycemic impacts [1] and numerous minerals and vitamins, amino acids, enzymes; natural sugars [2].

Recently we have no true pharmaceutical rival for this toxicity thus; managements of AlF_3 toxicity are administered regarding the use of antioxidant. With due immersion to this antioxidants and vitamins it appears to be that this herbal plant may be useful for management of AlF_3 toxicity mostly its nephrotoxicity effects by demolish the free radicals. The recent time work investigated to observe the oxidative injuries related to AlF_3 harmful curative role of Aloevera gel on male wistar rat.

Aluminium is the most broadly divided and the third most plentiful component on the Earth planet and it is utilized in the reconstruction of several daily life useful products. Many materials are madeby Al like foil, cans, cookware, deodorants, infant milk etc. Al also used for in medicinal purpose. Different vitamins, trace elements, minerals, the body does not need Al. Al deposit in the hepatorenal, brain and lungs where it enters with calcium (C) occupy and could mineralization of skeletal.

Pesticides containing Al leach in to the sand (soil)

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and interconnect with Fluoride (F) occurred in underground water so the chances to getting AlF_3 combine by water increments in field of high level underground water F conc. [3]. Al metal is utilized material in the automobile and aircraft factories, construction, in the process of alloys, in electric production and in and naturally found in potatoes, tea, spinach and prepared dairy products, elevation in Al contain food substance [4-6]. Al salts one also broadly utilized in water cure as coagulants to decrease biological qualities turbidity, color microorganisms stage. When enter by several paths Al & F could some poisonous compounds through body of human and other mammals.

Fluoride (F) is 1st of the more plentiful & broadly divided elements in environment. F is beneficial in tiny limit quantity for better health development of teeth & bones or avoiding dental cavities, but in extra amount caused a disease called fluorosis. Several harmful impacts of access F on population health were cause kidney (nephrite) injuries tubules because of continual filtration of the absorbed F, diseases of ageing and reproduction processing system [7].

The reasons of the India fluorosis is pandemic in seventeen states areas involving Rajasthan because of additional F contented in the underground water. The acceptable limitation of F in water which used for drinking purpose as recommended by Bureau of Indian standard vary between 0.6-1.2 ppm and WHO approves a maximal of 1.5ppm long term exposure to F about the acceptable limitation leading to dangerous impacts on several soft organ processes of metabolism. F is a (-) charged nonmetallic halogen than can be naturally obtainable in the water, rocks and sand (H Zuo).

Effects of F exposure in stages comparable one of the found in areas of unnatural water fluoridation and areas of endemic fluorosis in haemoglobin oxidation processes, observing that even tiny one. Could trigger mechanisms that injuries the animal and human body [8].

The renal are two bean shaped organs in the body, each about the size of a grip. They are stationed just below the ribs cage, both side of spin. Each of our kidneys (renal) is made up of about a multitude filtering unit called nephrons. The nephrons work through a 2- step procedure the glomerulus filters our body, and the tubule returns demand substances to body and withdraw wastes.

Renal withdraw waste and extra fluids from body. Renal also withdraw acid that is generated by the cells of body and maintenance a healthy balance of salts, water and minerals namely- potassium, sodium, calcium and phosphorus in our body. In absentia this equilibrium, muscles, nerves and other body tissues in body may not work generically. Our renal also make hormones that help in make RBC, keep bones strong and healthy and monitoring blood pressure (www.niddk.nih.gov.). The study investigated the curative effect of A. Vera in AlF_3 accumulated toxicity in male albino rats.

MATERIAL AND METHOD

Experimental model

Sixty male albino rats (150-200g) were obtained from the experimental animal's unit of the Zoology Department, School of Life Sciences, Khandari Campus, Agra. A pure inbred line of male albino rats, experiment having as per the guidelines of the institutional Ethical committee. The investigation which was carried out period of February to May 2022. All albino rats were kept under general laboratories situationsof temperature between 28^0C-32^0C, in 12 h light and 12 h dark condition, and maintained on standard rat's diet with ad libitum. All albino rats were stabilized for 30 days before commencement of the experiment.

Experimental Protocol

Sixty male albino rats randomly separated into 3 groups one of them control group and other 2 treated groups, 20 rats for each, treated orally by feeding tube as described below for 60 days. The albino rats in the control group were permit free access to water throughout the during experimental period. Treated group 1sttreated with distilled water along with aluminium fluoride (200mg/kg body weight) per day for 60 days. Treated group 2nd treated with aluminium fluoride along with Aloevera (300mg/kg body weight) received AlF_3 (the same previous dose) and Aloevera 300mg/kg b w at the same time. Dose selection of AlF_3 and Aloevera was based on previous research papers. At the last of the experiment, On the days 31 and 61, the rats were randomly selected and anaesthetized under light chloroform, their abdomens were opened carefully and dissected out carefully and collect the blood in sterilized test tube for biochemical parameters analyses.

Chemicals and drugs

In this study, Aluminium fluoride (AlF_3) was purchased from India Biologicals, bagh muzaffar khan, Agra, (Uttar Pradesh). Aloevera plant was collect from university botanical garden. The dose of Aluminium fluoride was 200mg/kg body weight [9] and Aloevera was 300mg/kg body weight [10]. These doses selected from previous published work.

Preparation of Aloevera gel extract

Aloevera was collected from our botanical garden SLS Khandari Campus, Agra (U. P.) India. After collection of A. vera was washed by mineral water to remove impurities leaves were removed using a sharp blade after that the leaves were cut by the clean and sharp knife and blended in an electric blender for 3-4 minutes. The melded material was pressed in a muslin cloth in the beaker. Aloevera gel ready for experimental albino rats.

Biochemical assays

Samples of blood collected by cardiac puncture were stored into heparinized tubes. The serum marker enzymes was used to evaluate kidney function by estimation of levels of activities of creatinine, uric acid, urea, potassium, sodium and blood urea nitrogen (BUN).

Statistical Analysis

All calculated values are expressed as Mean±S.Em. Data obtained were analyzed using Student 't' test, Differences between mean were considered significantly different when values $p<0.05$, $p<0.01$, $p<0.001$ were obtained using window 7 and analysis in MS Excel 2007.

RESULTS

In Table I the effects of long term ingestion of Aloevera gel on the biochemical profile of the albino rats. As though, oral administration of the Aloevera gel increased the creatinine, uric acid, urea, sodium, potassium and BUN were statistically significant. The all biochemical parameters values of the albino rats administered 300mg/kg b. w. Aloevera gel was higher ($p<0.05$) than compare to the control group rats. The creatinine levels significantly increase ($p<0.01$) after 30 and 60 days, uric acid level significantly increase ($p<0.05$) after 30 and 60 days smoothly significantly increase ($p<0.01$), urea after 30 days significantly ($p<0.05$) increase (In figure-I), and after 60 days highly significantly ($p<0.01$) increase, sodium after 30 days non significantly ($p<0.05$) decrease and after 60 days highly significantly ($p<0.01$) increase, potassium after 30 days significantly ($p<0.05$) increase and after 60 days highly significantly ($p<0.01$) increase and BUN after 30 days significantly ($p<0.05$) increase and after 60 days highly significantly increase compare to control group (In figure-II and Table II).The influences of aluminium fluoride (200mg/kg b. w.) AlF_3 and the administration of AlF_3 for 2 months followed by administration AlF_3 level of creatinine, uric acid (table-I, and Figure-I) urea, sodium, potassium and BUN in the albino rats were evaluated the AlF_3 treatment led to a very highly significant increase ($p<0.001$) after 60 days level of uric acid, urea, sodium, potassium and BUN relative to that control group (Table-I, and Figure-II).

Table I: Beneficial effects of Aloevera in kidney parameters (creatinine, uric acid and urea) of Albino rat after Aluminum fluoride intoxication.

S.No.	Parameters	No. of Albino rat	Period (days)	Control Group		Treated-I (AlF3)		Treated-II (AlF3+Aloevera)	
				Mean	±S.Em.	Mean	±S.Em.	Mean	±S.Em.
1	Creatinine	10	30	0.66	0.01	0.69	0.005**	0.70	0.005*
	mg/dL	10	60	0.81	0.01	0.86	0.010***	0.85	0.013**
2	Uric acid	10	30	3.35	0.38	4.44	0.175**	4.13	0.178*
	Mg/dl	10	60	4.13	0.4	5.99	0.140***	5.25	0.222**
3	Urea	10	30	27.26	0.236	30.0	0.412***	28.38	0.260*
	Mg/dL	10	60	32.67	0.123	35.01	0.374***	33.55	0.262**

S.Em. = Standard Error of Mean,

*** = Very Highly Significant ($p<0.001$), ** = Highly Significant ($p<0.01$), *= Significant ($p<0.05$).

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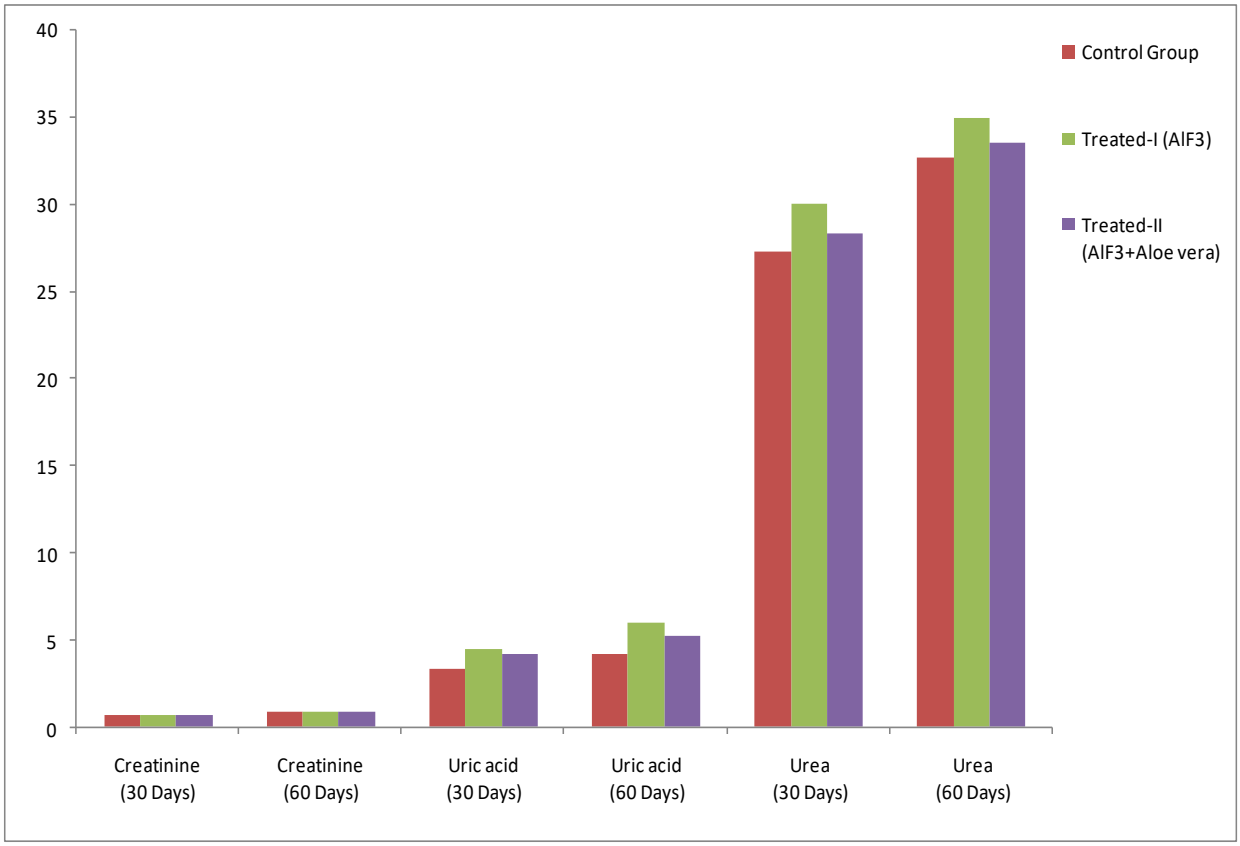

Histogram 1 (Increment in each parameters after 30 and 60 days treated with aluminium fluoride and aloe vera+aluminium fluoride comparison of control group)

Table II: Beneficial effects of Aloevera in kidney parameters (sodium, potassium and BUN) of Albino rat after Aluminum fluoride intoxication.

S.No.	Parameters	No. of Albino rat	Period (days)	Control Group		Treated-I (AlF_3)		Treated-II (AlF_3+Aloevera)	
				Mean	±S.Em.	Mean	±S.Em.	Mean	±S.Em.
1	Sodium	10	30	142.82	0.151	144.97	0.237***	142.61	0.295ns
	mmol/L	10	60	145.83	0.27	147.76	0.211***	147.13	0.191**
2	Potassium	10	30	4.11	0.15	5.96	0.207***	4.61	0.157*
	mmol/L	10	60	5.13	0.444	7.03	0.184**	6.75	0.209***
3	Bun	10	30	13.67	0.233	15.68	0.177***	14.33	0.248*
	Mg/dl	10	60	16.96	0.166	18.37	0.235***	17.87	0.235**

S.Em. = Standard Error of Mean,

*** = Very Highly Significant ($p<0.001$), ** = Highly Significant ($p<0.01$), *= Significant ($p<0.05$).

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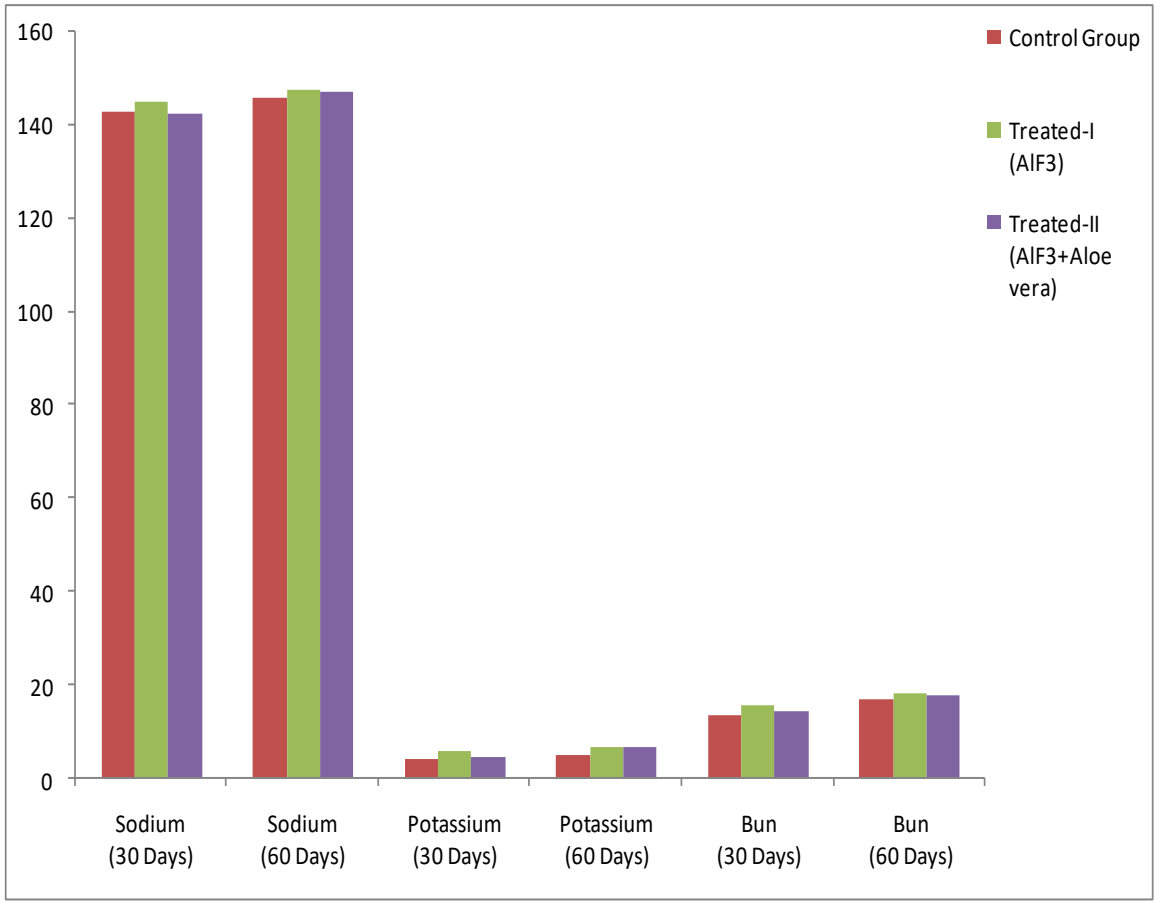

Histogram 2 ((Increment in each parameters after 30 and 60 days treated with aluminium fluoride and aloe vera+aluminium fluoride comparison of control group)

It was noticed that all groups of albino rats received the following experimental schedule- reveals the significant changes in all six parameters discussed here. After 30 and 60 days treated (aluminium fluoride) group 1st showed a significant ($p<0.001$) increase in the level of creatinine, uric acid, urea, sodium, potassium and BUN to AlF_3 toxicity compared to control group. Whereas significant ($p<0.01$) increase after 60 days in creatinine, uric acid, urea, sodium, potassium and BUN treated with Aloevera after 60 days' group 1st treated with AlF_3 showed a significant ($p<0.001$) increment in the level of creatinine, uric acid, urea, sodium, potassium and BUN to AlF_3 toxicity compared to the control group. It was showed that AlF_3 toxicity improves compared to 30 and 60 days. It means AlF_3 on long term exposure induced toxicity in group 2nd treated with Aloevera was also effective in reduction aluminum fluoride toxicity.

DISCUSSION

Our results hand over confirmation that acute exposure of albino rats AlF_3 induced toxicity which revealed as a reduction in meal and water consumption, function integrity of the vital organs. The revulsion to water and food intake reduced body weight [11]. The recent study recommends that the normal metabolism of the albino rats was not within normal physiological limits. The increment in weight of kidney may be assigned to stimulation of the body's adaptive mechanism to conflict systemic toxicity but serum biochemistry showed toxic effects of the chemicals. Several studies have described elevated concentration of Al^{3+} and F^-kidneys [12-13] that may show to renal damage [14-15]. The recent study was designed to estimate the therapeutic effect of Aloevera on aluminium fluoride (200mg/kg body weight) induced toxic changes in kidney parameters in albino rats.

The mature industrialized society increments aluminium fluoride solubility as outcome of continuing acidifies of the environment. Adverse biochemical effects of aluminium fluoride (AlF_3) and their improvement have been observed earlier in rat. This study suggested that ingestion of AlF_3 by male albino rat caused alterations in metabolism and structure in some of their organs [16-19].

Serum creatinine and urea are the finest biochemical enzyme markers for investigate of renal damage while they are changed through kidney. Urea is the essential nitrogenous waste productions of metabolism and is created from protein disintegrate. It is eliminated from the body nearly only by the kidneys in urine and measure of its conc., first in later in blood and urine has had clinical applications in the evaluation of renal function for well over 150 years [20].

The serum creatinine is present after the compound (chemical) creatinine is shattered down by the body in ordering to make energy for our muscles. The renal are commonly able of creatinine on a regularly. Our creatinine levels will increment, replicating less creatinine being separate out through the renal. Our BUN (blood urea nitrogen) replicating the amount of nitrogen (N_2) that is present in body in the form of a waste material called urea. BUN is used to pose if there is extra N_2 waste in body stream, if should have been clear out of our renal. Unless renal functions are damaged or rhabdomyolysis is strong hyperkalemia is a in proportionally uncommon metabolic complication of contaminating.

Hypokalemia is a more usual problem and nearly all potassium (P) disturbance in acute contaminating is due to disintegration of extra renal control mechanism observably the commotion of Na^+ (sodium) / K^+ (potassium) ATPase and potassium channels. Hypokalemia occur because of raised sodium/potassium ATPase activity. Especially if that latter is complex by kidney failure. Hypokalemia outcome in generalized muscle weakness, cardiac arrhythmias and paralytic ileus.

Significantly distraction of potassium homeostis is frequently unrecognized and may cause conceivable morgues and rate of mortality [21]. Excessive physical may double arterial plasma potassium in one min. It is because of excitation induce release of potassium from the operative muscle cells via potassium channels. Hyperkalemia may also rise from muscle cell damage intravenous (I. V.) regime of potassium or excessive oral, acidosic, renal failure, activation of potassium channels by fluoride (F) toxicity, depolarization of muscle cells with succinyl choline, hyperthermia inhibition of the sodium, potassium pumps by digitalis glycosides or nonselective beta blockers with treatment [22].

Hypokalemia is associated with a number of modifications in renal function and an increment is some renal membrane transporters its growth promoting impact on young one animal (rats) is well recognized. In one month's intoxicated albino rats the renal has displayed decreased lumen of the proximal tubules. The changes were comparable in 2 months' multiple doses rats besides atrophy of glomeruli. It is also attractive to observe the preventive effects of Aloin (Aloevera) against Al toxicity were more useful in the 2 months of treatment as compared to the 1 months of Aloevera treatments [23].

Uric acid is a chemical generated when the body disintegrate substances called purines. Creatinine, urea and uric acid, sodium ions levels serious histhopathological changes in the kidney parameters [24]. The treatment normally used in all disorders is DFOA (disferrioximine) exactly is a chelator such has a large capacity to reduce the Al body burden by incrementing its excretion in the urine [25].

Kidney from AlF_3 treated group's paleness grossly by the end of the experimental time. Creatinine and urea significantly increase treated AlF_3 after 7 days. These findings are similar [26], and urea and creatinine significantly increase treated with Aloevera, these results were in agreement [27]. Similar to the observation of the recently under taken study with the improving effects of Aloevera (Aloin) is well suggested [28].

The recent results have showed that Aloe Vera (Aloin) curatives the toxic effects of Al. The outcomes of this investigation revealed that A. vera gel (Aloin) slightly elevated the potassium, urea, creatinine and significantly raised in the uric acid, sodium and blood urea nitrogen (BUN) ranges in the albino rats that received the Aloevera gel is suggested that the gel arouse raised biochemical parameters in rats. This attribute examined in the Aloevera might be because of the proximity of riboflavin, thiamine, folic acid and

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necessary and non-essential amino acids in the mucilaginous gel [29].

It is clearly supporting that herbal/medicinal plant extract do have a favorable character in fight impact the dangerous outcomes of metals [28]. Various another investigation used Aloevera, also support our findings suggested that Aloevera gel extract showed kidney ameliorative effects against heavy metals injuries. [30-33]. In support with previous researches, outcomes from this work suggested that AlF_3 induced nephrotoxicity is indicated by significantly increment in creatinine, urea, uric acid, sodium, potassium and BUN. This suggested that Aloevera (Aloin is active compound) preventing aluminium fluoride toxicity in kidney.

CONCLUSION

The outcomes from the recent study revealed that AloeVera gel do not having any such toxic effects which will lead to agreement their curative application. Long time use of these medicinal/herbal plant demonstrate the effects which recommended Aloevera plant gel do not exhibit any harmful toxic effects in conditions of biochemical parameters of albino rats. The results also showed that Aloevera gel may have immune system combining effects. It too showed that Aloevera gel having defensive provable o nephritic cell. Finally, this study indicated that Aloevera gel curative effect on kidney after aluminium fluoride intoxication.

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