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## External curative effect of fresh aloe juice on traumatic blood stasis rat model

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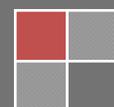
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### ABSTRACT

To verify fresh Aloe juice external use for treatment of blood stasis. Through the measurement of rat limb symptoms integral and perimeter, through the measurement of blood rheology examination and injury of rat limb soft tissue pathology observation, to observe the effect of topical external injury and blood stasis of fresh aloe juice. Compared with model group, large dose group of aloe right hind legs of rats injury symptoms integral decreased significantly ( $P < 0.01$ ), small dose group of aloe rats right hind legs injury symptoms integral was obviously lower ( $P < 0.05$ ); Compared with before modeling, in the 2th, 3th, 4th, 5th days, all aloe dose group of rats with right hind legs perimeter difference were significantly decreased ( $P < 0.01$ ); large dose group of aloe can significantly reduce all the indexes of hemorheology ( $P < 0.01$ ); small dose group of aloe can significantly decrease whole blood viscosity, HCT, whole blood high shear viscosity, whole blood reduction relative viscosity index ( $P < 0.01$ ), and can obviously reduce the blood viscosity, whole blood low shear reduction viscosity, IR, EAT, whole blood high shear relative viscosity index ( $P < 0.05$ ); all aloe dose group can significantly improve animal pathological tissue damage ( $P < 0.01$ ). Fresh aloe juice has a good treatment on traumatic blood stasis.

### KEYWORDS

Fresh aloe juice; External curative; Traumatic blood stasis; Rat model; Hemorheology.



## INTRODUCTION

Aloe, is fleshy, juicy liliaceous perennial herbaceous plants, with the flavor of bitter and cold. belonging to the main and collateral channels of liver, stomach, large intestine. It is rich in a variety of collagen and physiological active substances. It has various functions in bactericidal anti-inflammatory, decomposition of toxins, promote wound healing<sup>[1]</sup>. Isocitric acid of aloe has the effect of promoting blood circulation. The active water and aloe element can soft blood vessels, restore the role of vascular elasticity<sup>[2]</sup>. This article reports the external curative effect of fresh aloe juice on traumatic blood stasis.

## EXPERIMENTAL SECTION

**Animal and instruments:** Whistar rats, weighing 180~220g, half male and half female, provided by medical experimental animal center of Hebei Province, the certificate number: 804122;

**Instrument:** Homemade impactor (1 hollow tube, and it has 3 cm diameter, 25 cm high, and 1 iron pestle which weigh 1000 g); WFZ UV2000 uv-vis spectrophotometer, unika (Shanghai) instrument co., LTD production; FA (N) /JA (N) series electronic balance, Shanghai Minqiao Precision Instrument Co., Ltd.;

**Drugs and reagents :** Aloe, purchased from Henan Zhang Zhongjing large pharmacy Co Ltd, identified by teacher in Department of Pharmacognosy of Henan Traditional Chinese Medicine University, is Liliaceae aloe Kuraso Aloe barbadensis Miller of fresh products. Fresh aloe juice preparation: clean the leaf of fresh Aloe, Cut into small pieces of 3cm~ 5cm. Pare off leaf thorn on both sides firstly, then ripped blade, With a knife scraping transparent collagen into a paste, stirring evenly to obtain fresh aloe juice. Tianqi traumatic rheumatism plaster, guangzhou baiyun mountain pharmaceutical co., LTD., the batch number: N1001; Sodium chloride injection, yonghe pharmaceutical co., LTD. Of zhengzhou, the batch number: 070302221.

**Methods:** 50 rats were randomly divided into large and small dose group of aloe (LG is short for large dose group of aloe, SG is short for small dose group of aloe), the Tianqi group, model group and blank group, 10 in each group. 1 day before the experimental, remove rats right hind leg hair and measure its perimeter. On the experiment day, except the blank group, fix the rest of the groups, 1 hollow tub (the root diameter 3 cm, 25 cm high) in rat right lower limb soft tissue, then put 1 blunt iron pestle root weight about 1000g, from the top of the hollow tube free fall hit the right lower limb soft tissue of rats and cause significant subcutaneous bleeding and swelling of open soft tissue damage model. After a successful building, measure rat's right hind leg perimeter in each groups and record, and symptom integral (integral standard are shown in TABLE 1), and then give the corresponding drugs, large and small dose group were daub 100% aloe fresh juice and 50% fresh aloe juice (diluted with normal saline, thickness of 1.5 mm), Tianqi group daub Tianqi traumatic rheumatism plaster (thickness of 1.5 mm), model group and blank group with cotton dips in saline, wet compress, and covered with plastic wrap and tape fixed after the treatment. Drug every day contact with skin, wash drugs with physiological saline, treatment for five days. Since building in breeding and during treatment, everyday observe injured limb swelling and ecchymosis, record the injured limb symptoms integral (integral standard are shown in TABLE 1, the results are shown in TABLE 2) and perimeter difference (after using drugs perimeter subtract after using drugs perimeter, less than zero at 0), (the results are shown in TABLE 3), on the 6th day's morning, take blood from eye for hemorheology examination (the results are shown in TABLE 4), take the rat limb injury soft tissue fixed in 4% formaldehyde solution, paraffin embedding section, HE staining, the pathological observation (results see TABLE 5).

TABLE 1 : Trauma and blood stasis symptom integral standard in rats

subcutaneous ecchymosis	integral	muscle swelling	integral	muscle color	integral
great measure block	2	markedly swollen	2	deep purple dark	2
a small dot	1	a slight swelling	1	light dark red	1
no blood stasis	0	no swelling	0	normal colour and lustre	0

**Statistical Analysis:** Using SPSS 13 statistical analysis with for Windows software package was used for data analysis, measurement data with the mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ) said, count data using rank analysis.

## RESULT AND DISCUSS

The naked eye observation of Aloe on traumatic blood stasis rat model injury.

TABLE 2 shows that compared with the blank group, model group rats right hind leg injury symptoms were obvious ( $P < 0.01$ ), the building is very successful; in the 1th day, compared with model group, the rest groups of rats right hind leg injury symptoms integral were no significant difference ( $P > 0.05$ ), so even in different groups; in the 3th days, compared with model group, rats of Tianqi groups right hind leg injury symptoms integral can be significantly reduced ( $P < 0.01$ ), large dose group of aloe rats right hind leg injury symptoms integral was obviously lower ( $P < 0.05$ ); in the 5th

day, compared with model group, large dose group of aloe and Tianqi group of rats right hind leg injury symptoms integral can be significantly reduced ( $P < 0.01$ ), small dose group of aloe rat right hind leg injury symptoms integral was obviously lower ( $P < 0.05$ ).

**TABLE 2 : The injury index statistical results in different observation time**

Group	N	1d	3d	5d
Blank	10	0.00±0.00	0.00±0.00	0.00±0.00
Model	10	4.90±0.88	3.90±0.99	2.50±0.85
LG	10	5.00±0.82	2.80±1.43**	1.10±0.88*
SG	10	4.90±1.10	3.60±1.43	1.60±0.97**
Tainqi	10	5.00±0.82	2.90±1.20*	1.30±0.95*

Note:compared with model group,\*  $P < 0.01$ ,\*\*  $P < 0.05$

**Effect of Aloe on rat traumatic injury of right hind leg circumference blood stasis model**

**TABLE 3: Effect of Aloe on rat right hind leg perimeter difference in different time ( $\bar{x} \pm s$ )**

Group	N	1d	2d	3d	4d	5d
Blank	10	0.02±0.04*	0.03±0.05*	0.08±0.04*	0.07±0.05*	0.07±0.05*
Model	10	1.11±0.09	0.77±0.07*	0.60±0.09*	0.47±0.10*	0.32±0.13*
LG	10	1.08±0.18	0.58±0.15*	0.43±0.16*	0.30±0.15*	0.17±0.09*
SG	10	1.06±0.18	0.51±0.17*	0.33±0.10*	0.21±0.09*	0.09±0.06*
Tainqi	10	1.08±0.14	0.53±0.11*	0.38±0.10*	0.23±0.07*	0.10±0.07*

Note:compared with model group,\*  $P < 0.01$ ,\*\*  $P < 0.05$

**Effect of Aloe on rat traumatic blood stasis of blood rheology model**

**TABLE 4 : Effect of Aloe on rat traumatic blood stasis model of hemorheology (N=10)**

Group	Whole blood viscosity				Plasma viscosity	HCT	
	200S <sup>-1</sup>	30S <sup>-1</sup>	5S <sup>-1</sup>	1S <sup>-1</sup>	200S <sup>-1</sup>		
Blank	10.15±3.40	17.24±6.62	41.55±18.24	126.54±60.69	2.22±0.57	0.61±0.10	
Model	15.83±2.99	34.85±18.93	75.27±19.77	243.12±73.65	2.73±0.453	0.69±0.08	
LG	10.54±4.22*	18.02±8.31*	43.87±23.26*	134.73±78.24*	2.12±0.48*	0.55±0.09*	
SG	10.54±4.16**	23.13±9.34*	52.12±20.39*	163.71±68.66*	2.24±0.40*	0.59±0.09*	
Tainqi	11.47±5.35*	20.11±10.31*	50.38±28.64*	158.17±96.66*	2.20±0.54*	0.53±0.12*	
Group	Whole blood high shear reductive viscosity	Whole blood low shear reductive viscosity	IR	EAT	The relative viscosity of whole blood high shear	Whole blood low shear relative viscosity	TK
Blank	2.26±1.12	35.65±21.25	2.26±1.12	11.71±3.00	4.64±1.44	57.39±27.95	0.74±0.13
Model	3.57±1.63	65.48±30.1	3.57±1.64	15.20±3.70	6.14±2.15	95.16±40.15	0.83±0.13
LG	2.32±0.86*	42.80±22.19*	2.31±0.94*	11.48±3.19*	4.63±1.28*	57.42±28.08*	0.69±0.06*
SG	2.73±1.03*	45.49±24.00*	2.54±0.85**	12.26±2.96**	5.09±1.55*	63.98±28.99*	0.70±0.16**
Tainqi	2.51±0.89*	38.20±19.76*	2.35±0.72*	11.05±2.38*	4.81±1.06*	60.96±27.40*	0.68±0.13*

Note:compared with model group,\*  $P < 0.01$ ,\*\*  $P < 0.05$

TABLE 3 shows that, perimeter change of the right hind leg is a significant difference between the model group and the blank group ( $P<0.01$ ), the other group and the model group had no significant difference ( $P>0.05$ ), the packet is uniform; compared with the model group, treatment of 2th, 3th, 4th, 5th day, perimeter difference of large and small dose group of aloe and Tianqi group were significantly reduced ( $P<0.01$ ).

TABLE 4 shows that, compared with the control group, there were significant differences in the indexes of blood rheology in model group ( $P<0.01$ ), indicating a successful model; compared with the model group, large dose group of aloe and Tianqi group can significantly reduce each hemorheology indexes ( $P<0.01$ ); small dose group of aloe could reduce Whole blood viscosity, HCT, high shear reduced viscosity, relative viscosity of whole blood low shear index ( $P<0.01$ ), can significantly reduce the plasma viscosity, whole blood low shear viscosity, IR, EAT, whole blood high viscosity index ( $P<0.05$ ).

### Effect of Aloe on pathological injury in rats with blood stasis model

**TABLE 5 : Effect of aloe damaged skin pathological changes of traumatic blood stasis model**

Group	N	—	+	++	+++
Blank	10	10	0	0	0*
Model	10	0	0	1	9
Tainqi	10	7	3	0	0*
LG	10	2	5	3	0*
SG	10	2	3	5	0*

**Note:compared with model group,  $P < 0.01$  \***

"-" the experimental animal skin epidermal structure of each layer and the dermis structure were normal; "+" experimental animal damaged skin epidermal structure of each layer and dermis structure have been restored and inflammation cells infiltration visible minorities; "++" experimental animal damaged skin of each layer structure and dermis structure can be recovery, a large number of inflammatory cell infiltration; "+++" experimental animal damaged skin epidermal structure of each layer and dermis structure were not restored and a large number of inflammatory cell infiltration.

TABLE 5 shows that, compared with the blank control group, histopathological damage evident in model group ( $P<0.01$ ); compared with the model group, Tianqi group, large and small group of aloe could significantly improve the animal histopathological damage ( $P<0.01$ ).

### CONCLUSIONS

"Huang Di Nei Jing" said: "people are falling down, the evil blood stay inside. External torsion contusion, and damage the vein, blood escape outside vein, so bad blood accumulation, block the circulation of Qi and blood, become blood stasis for a long time<sup>[3]</sup>. This paper is mainly to solve the effect of fresh aloe vera juice external to the syndrome of blood stasis. The main clinical symptoms of blood stasis syndrome are pain, swelling, petechia etc. This experiment will hit the right hind limb in rats traumatic soft tissue caused blood stasis model, right leg appears red, blood stasis, the same as the clinical symptoms consistent with soft tissue injury.

To better estimate the external curative effect of fresh Aloe juice on traumatic blood stasis rat model, the experiment were evaluated for the right hind leg injury symptoms integral changes, perimeter changes of the right hind limbs of the same location, hemorheological indexes and pathological changes; injury symptom integral changes and perimeter changes can directly reflect swelling degree of local tissue damage; blood rheology examination is an important index to observe the condition of blood stasis, plasma viscosity reflects the changes of various substance concentration in plasma, have good application value in the measurement of blood stasis syndrome; at the same time, the pathological changes in reaction damage reflect healing tissue layers of skin inflammatory cell infiltration

The experimental results show, fresh aloe juice topical can reduce symptoms injury of right hind leg, significantly reduced the right hind leg perimeter difference, can reduce the hemorheology indexes. This prompting fresh aloe juice external curative has good treatment on traumatic blood stasis. This experiment provides a simple method for the clinical treatment of local traumatic blood stasis, provides experimental basis for the study of the function of aloe.

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