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Assessment of mutual impact of different sodium citrate concentrations and minimum specimen volume on the result of routine coagulation tests

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✳**Abstract**

Background: Routine coagulation assays including prothrombine time [PT] and activated partial thromboplastine time [aPTT] are influenced by two independent parameters comprising sample volume and tri-sodium citrate concentration.
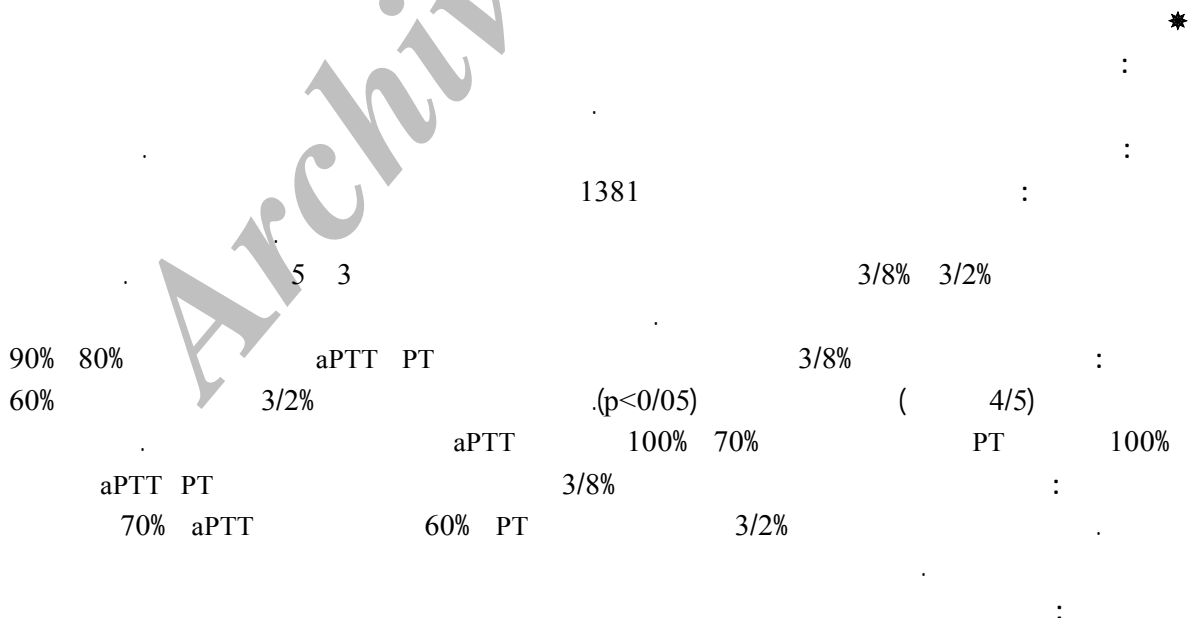
Objective: To evaluate minimum specimen volume requirements for routine coagulation testing with dependence on citrate concentration.

Methods: An experimental study was performed on samples obtained from randomized healthy persons and patients receiving oral anticoagulant therapy. The tubes (3.2% and 3.8% sodium citrate) were filled to varying total sample volumes ranging from 3.0 to 5.0 mL and results of routine coagulation tests were compared.

Findings: By using 3.8% citrate, there is a statistically significant difference in the results of PT and aPTT assays in the sample less than 80% and 90% filled compared with those that are 100% filled. There is no significant difference in PT results from a 3.2% citrate tube between fill volume of 60% and 100% as well as 70% and 100% for aPTT.

Conclusion: Underfilling may significantly affect the aPTT and PT, resulting in artifactual prolongation of results, particularly in samples drawn into 3.8% citrate. This study supports the recommendations to use 3.2% citrate, because 60% of the optimum filled for PT and 70% for aPTT are acceptable.

Keywords: Prothrombine Time, Thromboplastine, Tri-sodium Citrate, Blood

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1381   :

.   5   3   3/8%   3/2%

.

90% 80%   aPTT PT   3/8%   :
60%   3/2%   .(p<0/05)   (4/5)
.   aPTT   100% 70%   PT   100%
aPTT PT   3/8%   :
70% aPTT   60% PT   3/2%   .

.

:

﷼ :

.

60 .

30 .

.

1/8

. 3/8 0/2

100×12×11 3/2

0/5 1 9

3/8 .

35 [5 4]. 3/2 55 25

NCCLS .

20 90

. (5)

55

3 3/8

5 4/5 4 3/5

3 2/5 2 3/2

. 4 3/5

2

1500g 15 (PT)

[6] [2 1]. aPTT

(Plateletpoorplasma) NCCLS

3/2

40 [7 6]. 10^9

20 3/8 [3 1].

3/2

aPTT PT . aPTT PT

. Sysmex

30

.

. « » ﷼ :

« » 1381

60   50

4/5   «

«   .(1   )

168   30 aPTT PT

.

0/5   3/8   PT   60   100

.   aPTT

60

(5)

.   1

3/2   .   .   aPTT PT

3/8

.   3/2   (

.(2

168 aPTT PT

.

100)

☀ :   (   )

aPTT PT   15

3/8

.

3/8   aPTT PT   80 70

aPTT PT   .

.   70 80

3/2

3/2 aPTT PT   aPTT PT

.(3   )   60 70

aPTT PT

PT aPTT   **-1**

	aPTT(s)		PT(s)		
NS	27/3 ± 0/5	NS	10/9 ± 0/2	100	3/8 (40 =)
NS	28/3 ± 0/6	NS	11/1 ± 0/2	90	
< 0/05	29/8 ± 0/7	NS	11/4 ± 0/2	80	

< 0/05	34/7 ± 0/9	< 0/05	12/5 ± 0/2	70	
< 0/05	40/4 ± 1/2	< 0/05	14/2 ± 0/2	60	
NS	25/2 ± 1/5	NS	10/7 ± 0/6	100	
NS	25/7 ± 1/6	NS	10/6 ± 0/7	90	
NS	26/1 ± 1/4	NS	10/7 ± 0/7	80	
NS	26/8 ± 1/8	NS	10/9 ± 0/8	70	3/2 (20 =)
< 0/05	28/2 ± 1/8	NS	11/2 ± 1	60	
< 0/05	31/5 ± 2/5	< 0/05	12/7 ± 1/1	50	
< 0/05	36/9 ± 4/3	< 0/05	14/7 ± 1/8	40	

NS :

:   /   4/5)   (× 100

-2   **PT   aPTT**

3/2

	aPTT(s)		PT(s)	
NS	31/4 ± 4/3	NS	19/1 ± 3/6	100
NS	34/5 ± 4/6	NS	19/0 ± 3/5	90
NS	35/3 ± 4/9	NS	19/1 ± 3/7	80
NS	37/1 ± 5/5	NS	20/3 ± 6/2	70
< 0/05	47/3 ± 10/4	NS	20/7 ± 4/8	60

NS :

:   /   4/5)   (

-3   **PT   aPTT**

3/2   3/8

	aPTT (s)	aPTT (s) 100%		PT (s)	PT (s) 100%			
-2	40/6 ± 1/6	41/3 ± 7	4	22/9 ± 2/4	21/9 ± 8/8	25	4/4 -5	

2	50/4 ± 1/7	49/4 ± 5/4	14	36/6 ± 4/4	31/7 ± 10/8	16	4 -4/4	
8	46/6 ± 1/9	42/7 ± 8	21	30/5 ± 2/8	24/3 ± 10/2	37	3/5 -3/9	
32	62/4 ± 4/9	46/3 ± 11/2	70	53/5 ± 7/6	29/2 ± 15/3	32	3 -3/4	
52	68/6 ± 4/3	44/8 ± 9	103	49/9 ± 6/4	23/4 ± 11/7	36	2/5 -2/9	
95	90/1 ± 9/3	45/5 ± 9/5	214	80/3 ± 11/2	24/6 ± 9/5	15	2 -2/4	
167	110/7 ± 22/7	40/6 ± 10/3	293	80/2 ± 16/2	26/4 -9/9	7	1/5 -1/9	
2	39/5 ± 8	39 ± 7/6	2	15/7 ± 5	15/4 ± 4/7	18	4 -5	
6	49/1 ± 7/7	46/5 ± 6/9	13	29 ± 9/7	25/5 ± 7/4	25	3/5 -3/9	
11	52/4 ± 12/7	47 ± 10/6	18	27/1 ± 9/7	22/7 ± 7/3	23	3 -3/4	
32	59/6 ± 24/3	45 ± 12/5	52	32/5 ± 16/3	21/1 ± 8/4	19	2/5 -2/9	3/2
55	72/8 ± 26/7	47/1 ± 13	66	43/2 ± 25/7	24/9 ± 9/8	36	2 -2/4	
189	109 ± 37/4	39/4 ± 12/4	201	61/1 ± 51/8	19/1 ± 10/5	27	1/5 -1/9	
308	153/6 ± 36	39/2 ± 9/4	596	119/2 ± 52/1	19/1 ± 5/9	20	1 -1/4	

$$+ (\quad 0/5) \qquad =$$

$$\frac{aPTT \ PT \quad\_\quad aPTT \ PT}{aPTT \ PT} \times 100 \quad :$$

❋   :

PT

aPTT .

90   3/8   .   aPTT

.

NCCLS .

PT   (3 1) .   (8) .

3/8

.   80   aPTT PT

3/2 .

60 70   aPTT PT

.   aPTT PT

3/2

3/2

3/8 .

55

3/2

NCCLS   H21-A2

aPTT PT

25   NCCLS .

90

3/2   55

International   3/8   (1)

2/7   0/7   Ratio Normalization

NCCLS

1   9

(3 1)

(9)

aPTT PT

3/2

3/2   3/8   aPTT PT

(11)   PT

aPTT

3/8

70   3/2
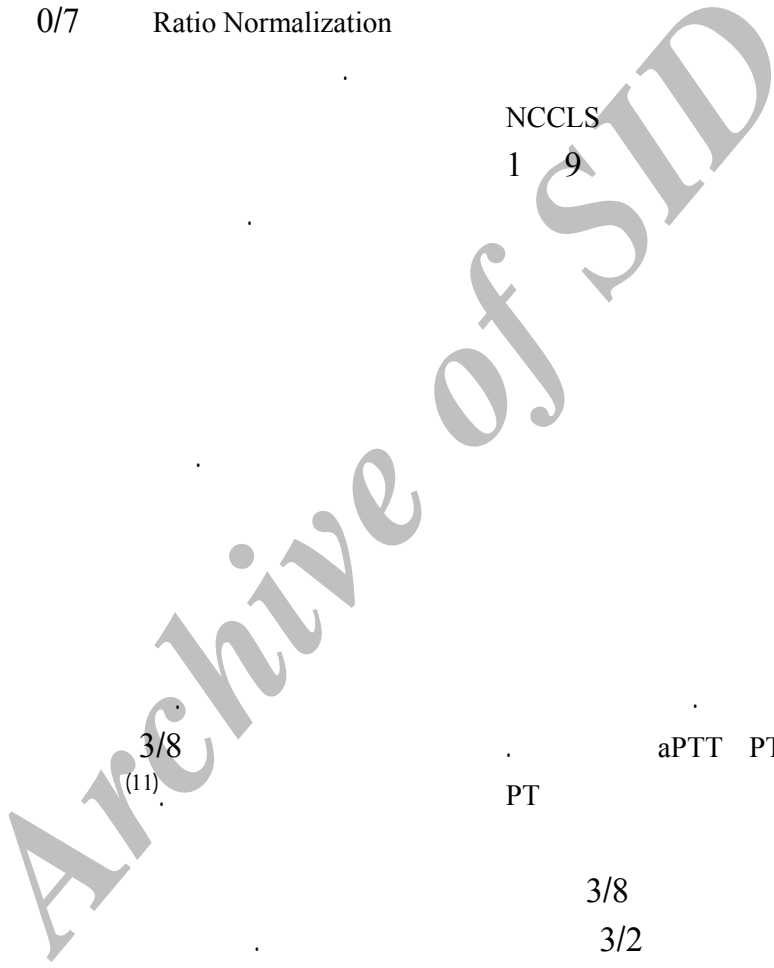
aPTT PT   (11 10)

(   )   PT

0/1

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