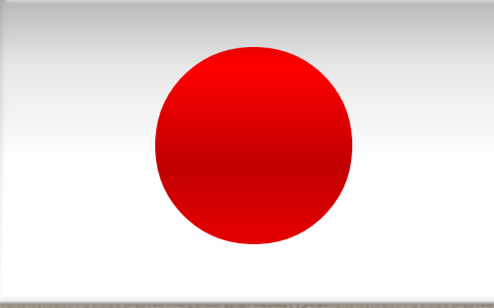


Factors influencing range of motion in knee joints of patients with haemophilia who underwent total knee arthroplasty after more than 3 years of follow-up



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Introduction and Objectives:

There are very few reports concerning about total range of motion (TROM) from extension to flexion after total knee arthroplasty (TKA) in patients with hemophilia (PWH). Sustained rehabilitation is recommended for maintenance of ROM after TKA. However, there are some patients whose TROM deteriorates after discharge in spite of sustained rehabilitation. The purpose of this study was to investigate the factors that influence change of knee joint TROM after discharge.

No.	Age	Diagnosis	Inhibitor	Comorbidity	Height (cm)	Weight (kg)	BMI	Arnold classification
1	50	Severe A	None	HCV	161	52	20.1	Stage V
2	45	Severe A	None	HCV	166	64	23.2	Stage IV
3	37	Moderate B	None	HBV,HCV	170	77.3	26.7	Stage V
4	47	Severe A	None	HCV	162	57.6	22.1	Stage V
5	33	Severe A	High Responder	HCV	151	64	28.1	Stage V
6	30	Severe A	None	HCV	175	65.7	21.5	Stage IV
7	38	Severe B	High Responder	HCV	157	52.1	21.3	Stage V
8	42	Severe A	None	HCV	157	54.8	22.2	Stage V
9	34	Severe B	High Responder	HCV	162	49	18.7	Stage V
10	52	Mild A	None	HCV	176	65	21.1	Stage V
11	44	Moderate A	None	HBV,HCV	175	67	21.9	Stage V
12	39	Severe A	None	HCV	177	70	22.5	Stage IV
13	47	Severe A	None	HCV,HIV	171	63	21.5	Stage V
14	32	Severe A	None	HCV	169	69	24.2	Stage V
15	47	Severe A	None	HCV	172	78	26.4	Stage V
16	37	Severe A	None	HCV	166	62.6	22.8	Stage V
AVE ±SD	40.9 ±6.8	Severe12 Moderate2 Mild1	Inhibitor3	HBV2 HCV16 HIV1	166.5 ±7.8	63.2 ±8.5	22.8 ±2.5	Stage IV 3 Stage V 13

Fig 1: Pre-operative data. 16 TKAs performed on 16 PWH (hemophilia A=13; hemophilia B=3) from June 2009 to November 2012 in our hospital.

Materials and Methods:

Thirty-three TKAs were performed in 31 PWH from June 2009 to November 2012 in our hospital. Among these patients, 16 PWH who continue to receive outpatient rehabilitation for more than 3 years postoperatively were included in this study: 13 patients with hemophilia A (1 have inhibitor) and 3 with hemophilia B (2 have inhibitor) (Fig1). To determine the factors affecting change of TROM at more than 3 years post-operatively compared with that at discharge, the following parameters were evaluated: TROM before operation (pre-op), at discharge and at follow-up, physical functions such as gait speed or muscle strength at pre-op and post-op, frequency of bleeding from discharge to last follow-up (Fig2). The correlation was analyzed using Spearman test. P-value<0.05 was considered statistically significant.

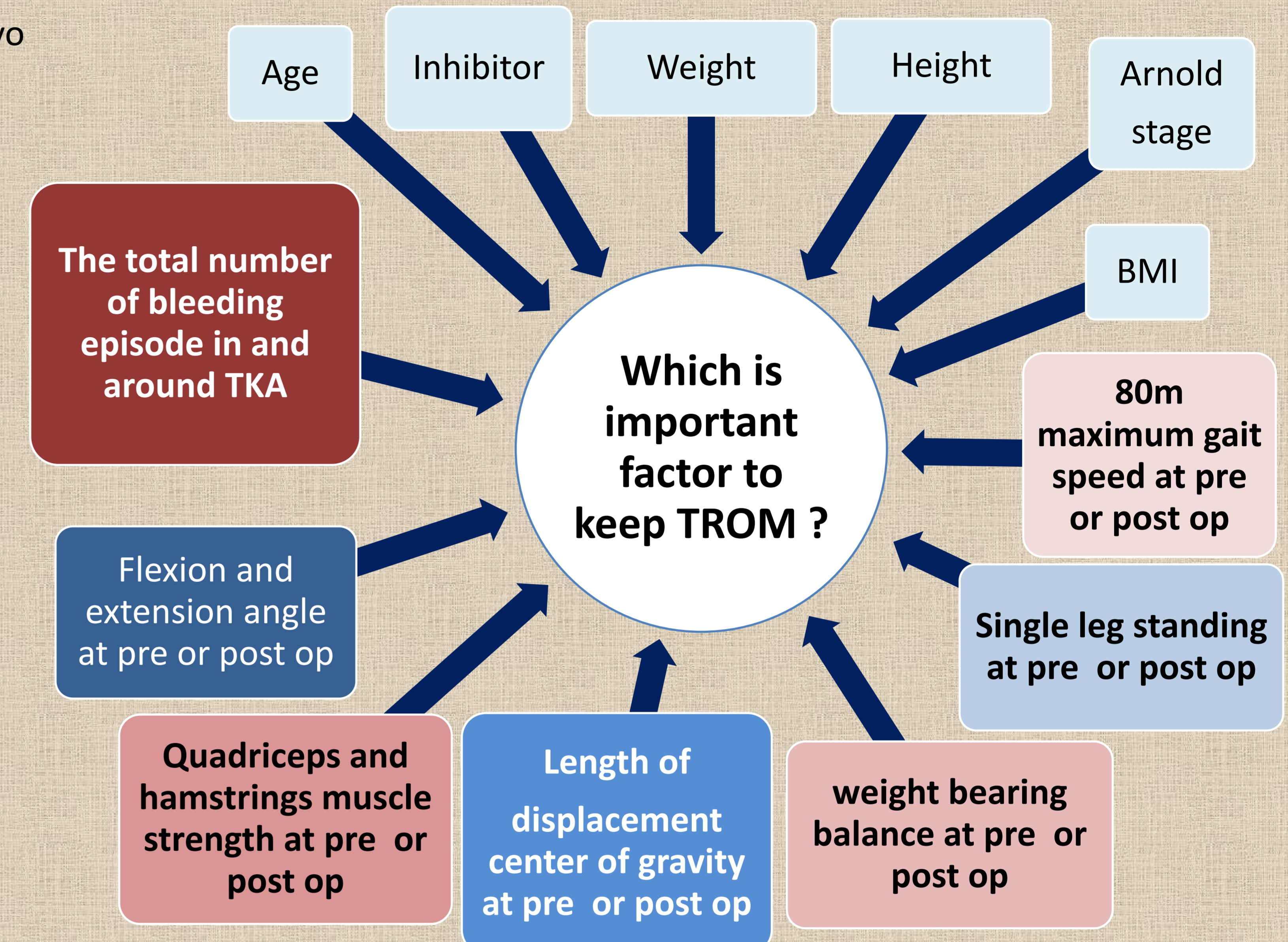


Fig2: Each Factors

Results:

The average age, post-op period in hospital and follow-up period were 40.9±6.8 years, 5.8±2.6 weeks and 202.8±57.7 weeks, respectively. The mean TROM at pre-op, discharge and follow-up was 77.5±28.5°, 98.4±20.5° and 101.3±24°, respectively. The mean change of TROM at more than 3 years post-operatively compared with that at discharge was 4.1±19.9°. No bleeding was observed in 7 knee joints, once in 7 joints and 2 times in 2 joints during follow-up. Among the evaluated factors, only the total number of bleeding episode in and around TKA had significant negative correlation to the change of TROM (r=-0.623,p=0.01)(Fig3). Following factors were no significant but positive correlation with the change of TROM which were Arnold stage, not-operative-side (opposite-side) quad muscle strength at pre operation, opposite-side extension angle at discharge, and negative correlation was high in discharge op-side flexion angle (Fig4).

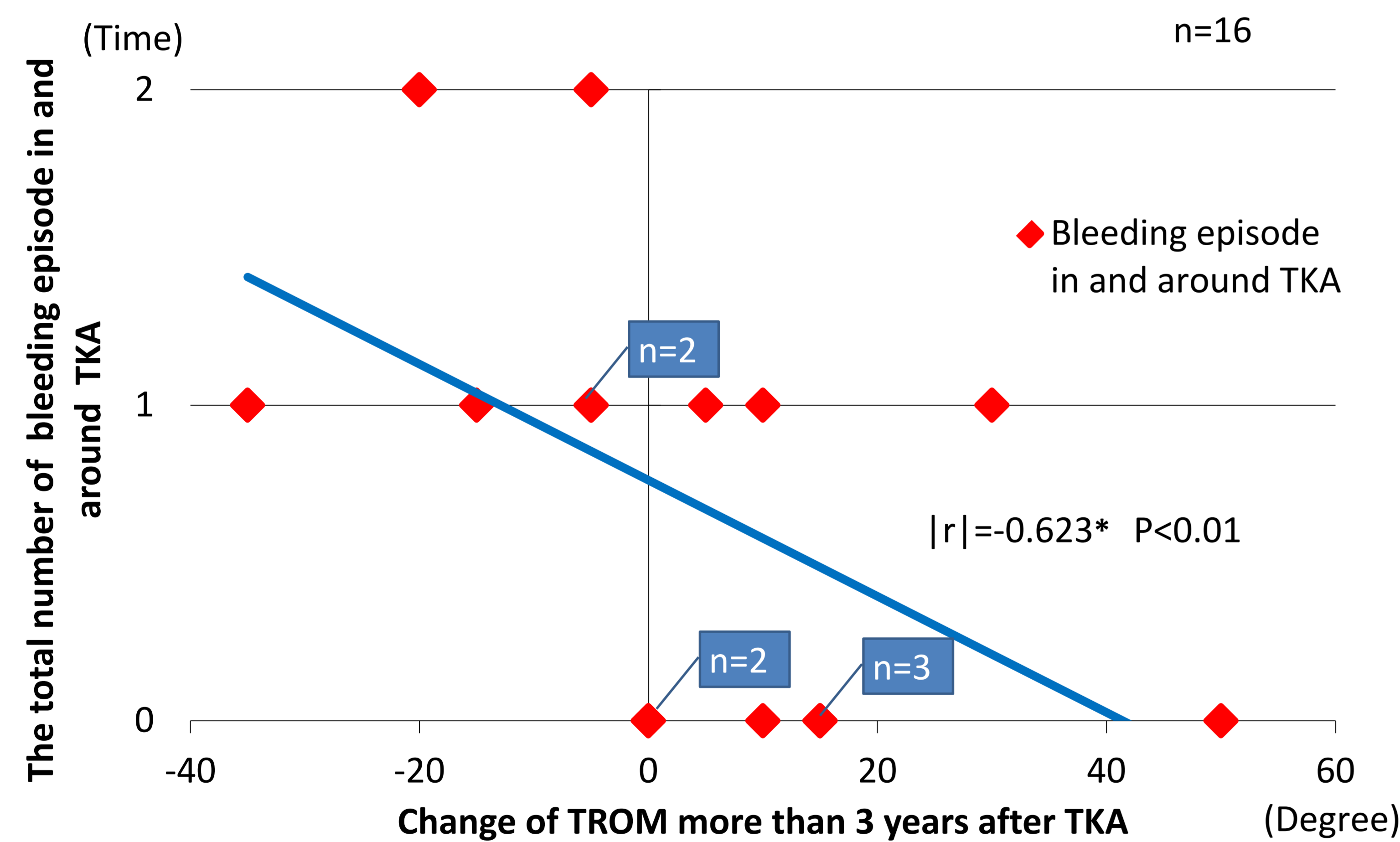


Fig3: Patients who have better after 3 years TROM tend to be lower The total number of bleeding episode at in and around postoperative knee.

	Age	Inhibitor	Height	Weight	Arnold stage	BMI	80m maximum gait speed at pre-op	80m maximum gait speed at discharge	Op-side single leg standing at pre-op	Op-side single leg standing at discharge	Opposite side single leg standing at pre-op	Opposite-side single leg standing at discharge	Weight bearing balance at pre-op	Weight bearing balance at discharge	Length of displacement center of gravity at pre-op	Length of displacement center of gravity at discharge
Spearman's p r	0.061	-0.087	-0.041	-0.072	0.473	-0.104	0.015	-0.372	0.203	-0.378	-0.047	0.17	0.121	0.372	-0.026	-0.005
P value	0.823	0.747	0.881	0.791	0.064	0.702	0.961	0.210	0.487	0.487	0.183	0.562	0.679	0.172	0.928	0.985
Op-side quad muscle strength at pre-op	0.234	-0.149	0.458	0.379	-0.101	0.23	0.223	-0.157	-0.448	0.256	0.332	0.197	-0.099	0.248	0.483	-0.623*
Op-side quad muscle strength at discharge	0.383	0.596	0.075	0.147	0.721	0.430	0.444	0.562	0.081	0.339	0.209	0.464	0.715	0.354	0.058	0.010

Fig4: Change of TROM more than 3 years after TKA spearman's p correlation coefficient • 0.4 < |r| and P < 0.05 :Strong correlation

Discussions:

In the report of F.Kamath et al, they suggested that TKA joint ROM was increased beyond 12-18 months after TKA by appropriate physiotherapy. In this study, among 16 patients who continued follow up of the physiotherapy after the discharge, we also showed that ROM improvement of the knee beyond 36 months after TKA if they didn't have bleeding episode in and around postoperative knee. The annual bleeding number was less than once because most bleeding episode number was two at three years and more, however the bleeding episodes in and around TKA was influenced on the TROM significantly. AS for two of the patients who had two bleeding episodes in and around the TKA have high responded inhibitor.

It was suggested:

- ① TROM may have decreased even 1 times of the bleeding episode at in and around TKA.
- ② Preventive management of the bleeding is very important with continuous physiotherapy to prevent postoperative TROM decrease.