

INTRODUCTION

Platelet-Rich Plasma (PRP) has been extensively used in multiple orthopaedic injuries treatments, either traumatic or degenerative. Despite considerable known PRP differences resulting from different preparations methods, there are also some variability when using the same standard protocol for all patients.

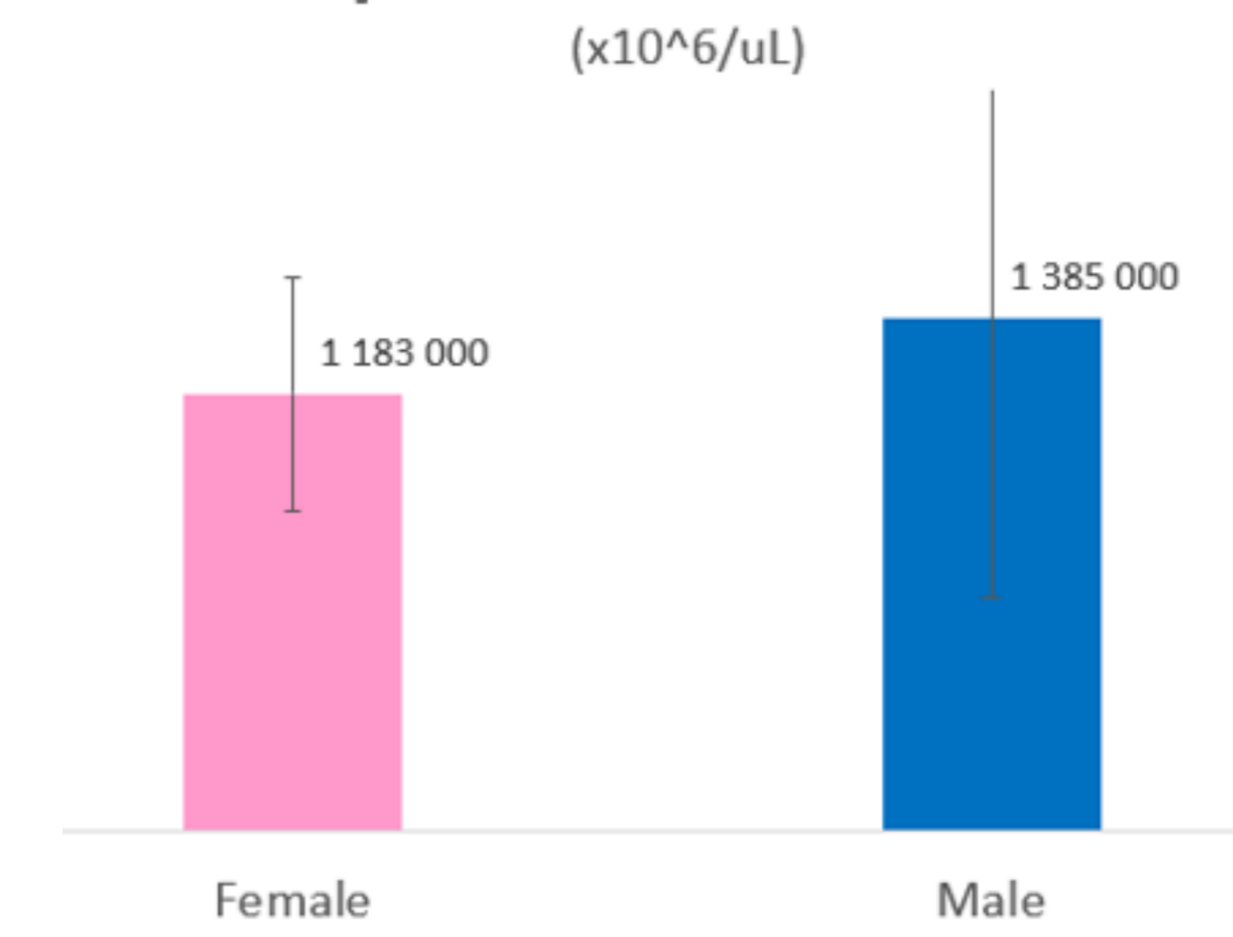
A relevant issue is the **PRP volume unpredictability**.

PRP - HETEROGENEOUS PREPARATION METHODS

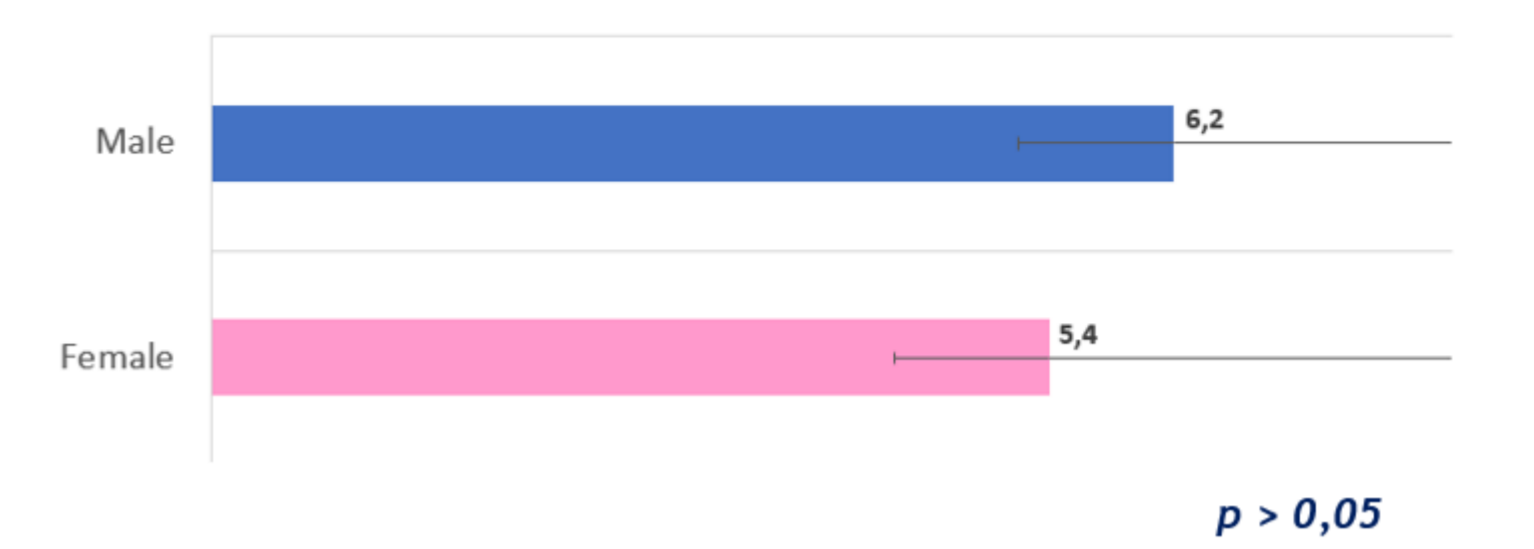
Kit	Cell Type	Mean, ×10 ⁹ /L	SD, ×10 ⁹ /L	PLATELET DOSE	PRP Volume
Control	Platelets	269	106	2 678 × 10 ⁹ /L	6,5 mL
	WBC	8.73	3.75		
	RBC	4.7	0.436		
ACP	Platelets	412	140	6 266 × 10 ⁹ /L	7 956 × 10 ⁹ /L
	WBC	1.3	0.781		
	RBC	0.0333	0.0577		
GPS	Platelets	964	551	8 229 × 10 ⁹ /L	PLATELET DOSE until 3x superior !
	WBC	35.8	10.8		
	RBC	1.03	0.289		
SmartPrep	Platelets	1224	560	8 229 × 10 ⁹ /L	PLATELET DOSE until 3x superior !
	WBC	24.7	8.69		
	RBC	1.43	0.306		
Magellan	Platelets	1266	831	8 229 × 10 ⁹ /L	PLATELET DOSE until 3x superior !
	WBC	31.4	9.4		
	RBC	1.03	0.153		

*RBC, red blood cell count; WBC, total white blood cell count.

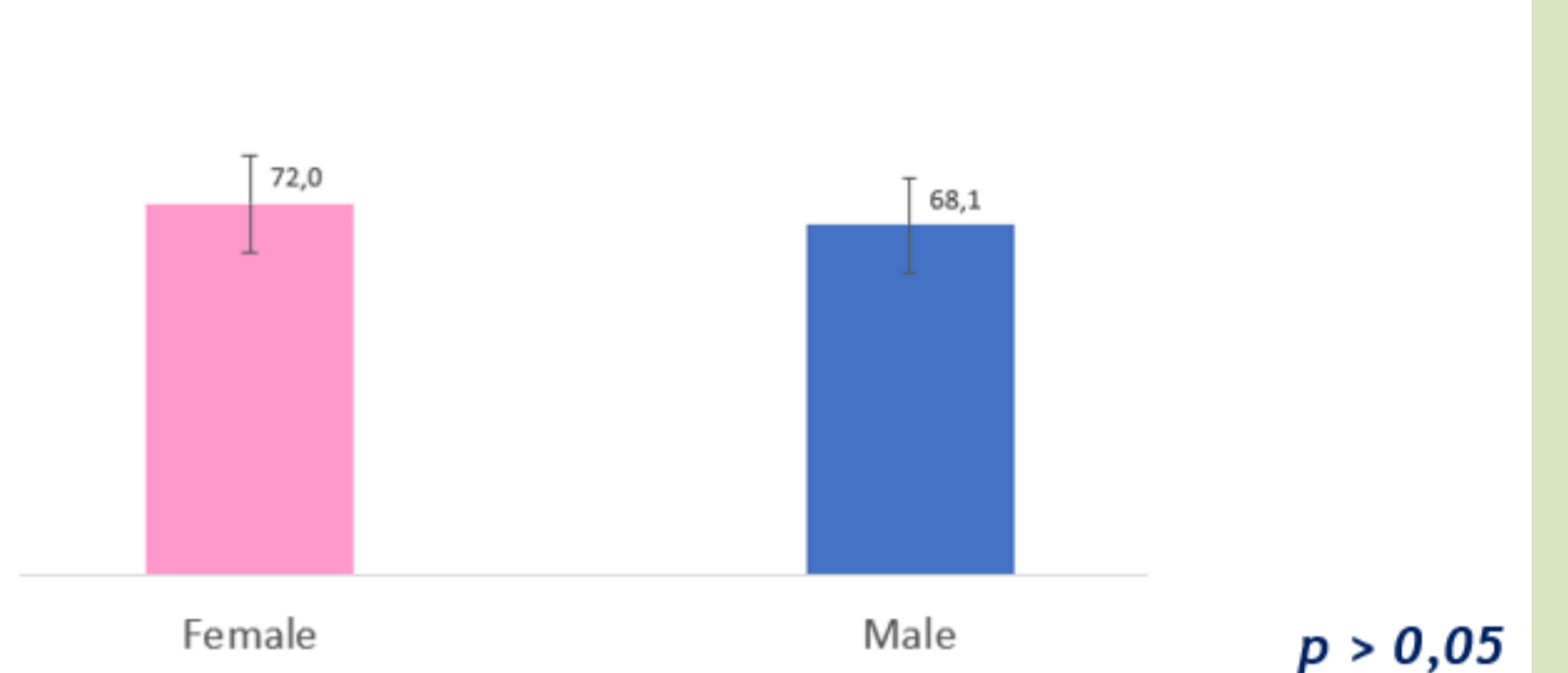
PRP platelet concentration



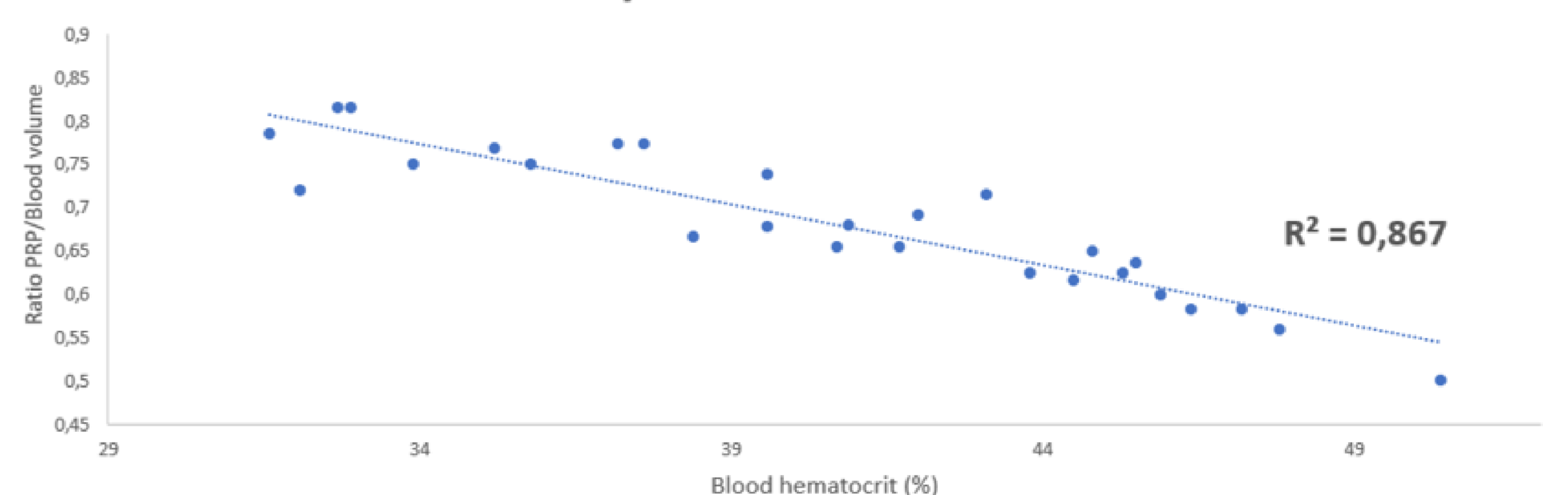
Platelet yield



Ratio PRP volume/blood volume



Correlation ratio PRP/Blood volume vs Blood hematocrit



OBJECTIVE

This laboratory study aims :

- 1) to evaluate PRP platelet concentration, platelet yield and PRP volume
- 2) to analyze PRP volume and blood haematocrit relation
- 3) to identify gender differences

MATERIALS & METHODS

Study design: Experimental laboratory study

Five milliliters of venous blood were collected from 30 knee osteoarthritis patients. One milliliter was used as control to quantify platelet count, red blood cells, haematocrit and haemoglobin. The remaining 4 cc were centrifuged. PRP was prepared by single spin centrifugation at 300g during 5 minutes. After centrifugation, PRP volume and platelet concentration were quantified. Platelet yield was calculated.

Statistical analysis: SPSS Statistics® v250

RESULTS

The total mean **PRP platelet concentration** was 1 284 000x10⁶/uL (95% CI, 1 031 000x10⁶/uL to 1 537 000x10⁶/uL).

In men and women was 1 385 000x10⁶/uL (SD 827 000x10⁶/uL) and 1 183 000x10⁶/uL (SD 497 000x10⁶/uL), respectively (p>0,01).

PRP volume/blood volume ratio was 71 % (95% CI, 69 to 73%). Despite being lightly higher in women (72% vs 68%), this difference was not statistically relevant.

The mean **platelet yield** was 6,2 (SD 3,6) and 5,4 (SD 5,4) times, for men and women respectively (p>0,01).

A **negative correlation** was verified between **haematocrit and PRP volume** (R² = 0,867), which is noticeable in people with lower haematocrit who achieve higher PRP volume.

Linear regression (PRP/blood volume ratio= - 0,015 Htc + 1,29).

DISCUSSION

5 mL
[Platelet] = 1 000 000/uL
Plat dose = 5 000 000/inj



**What really matters?
PLATELET DOSE!**

10 mL
[Platelet] = 500 000/uL
Plat dose = 5 000 000/inj



Platelet dose: PRP [Platelet] x PRP volume

ADVANTAGES

- Patient target joint treatment
- Patient convenience and satisfaction
- Costs saving / Reduced biological and material wasting

CONCLUSION

There are **no differences** in PRP platelet concentration, volume and platelet yield between gender.

Haematocrit has a negative correlation with **PRP volume**.

PRP volume can be **predicted** from haematocrit by the formula:
venous blood collected (mL) x (- 0,015 Htc (%) + 1,29).

This patient-customized approach will allow to predict the exact venous blood volume needed to achieve a desired PRP volume. Further studies are needed to validate and improve the formula

Contacts

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