Global Scientific JOURNALS

GSJ: Volume 10, Issue 2, February 2022, Online: ISSN 2320-9186
www.globalscientificjournal.com

External validation of the FUllPIERS model in women with pre-eclampsia.

Authors: Dahmani Hela, Hajjaji Awatef, Jebali Fethi **, Kacem Hela, Khouildi Ghada, Gadhab Imen, Zouari Ines, Felah Raja.

Département: Service de gynécologie obstétrique, Centre de maternité et de néonatologie de Monastir 5000, Université de Monastir, Tunisia.

**Département d'anesthésie réanimation, Centre de maternité et de néonatologie de Monastir 5000, Université de Monastir, Tunisia.

Abstract

Keys Word: Pre-eclampsia, Score, FULLPIERS, ROC curve, Specificity, Sensitivity.

Introduction: Pre-eclampsia is a frequent pathology of pregnancy associated with a high maternal and fetal morbidity. Its prevalence is approximately 2 to 3%; and 1% in the case of severe forms responsible for 58% of hospitalizations. To date, only one clinical and biological score exists to predict the evolution of pre-eclampsia: FULLPIERS.

Objective: The objective of our work is to propose an external validation of the FULLPIERS score.

Materials and Methods: A prospective, mono-centric, descriptive, observational study was conducted, including 150 pre-eclampsia parturients. The performance of the score was evaluated at 48h after admission via ROC curves.

Results:

A total of 235 records were collected during the study period.

The records were distributed as follows: 150 included in our study, 40 patients in spontaneous labour (bishop score > = 6), 25 cases with complications (HRP, HELLP, convulsion ...) and 20 cases of non-consenting patients.

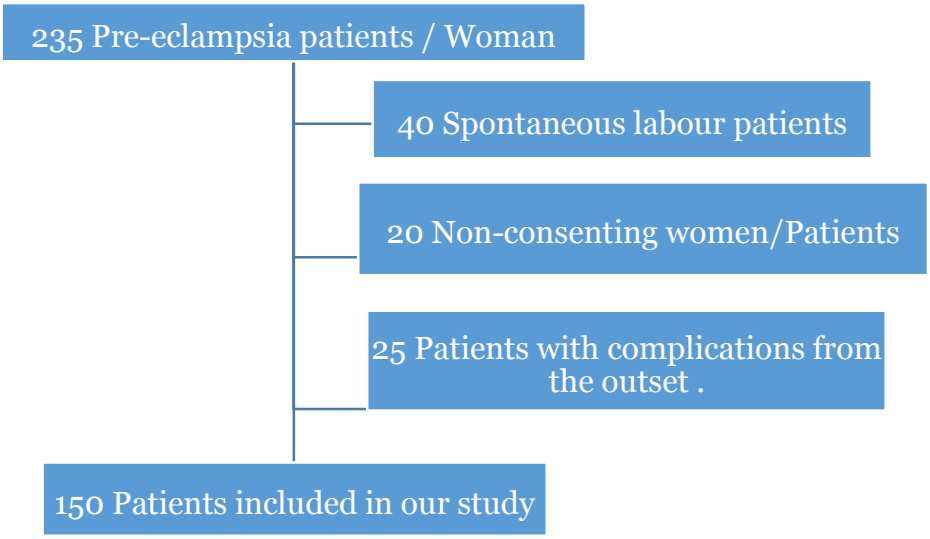

Figure 1: **Flow chart of patients.**

The incidence of this condition in our study is 2.6%.

Twenty-six patients developed complications during their stay in the department (17.3%).

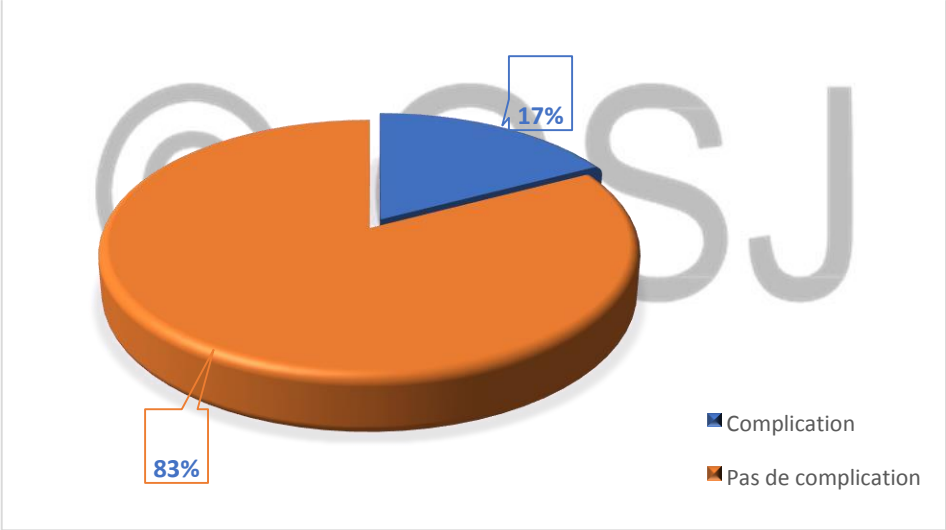

Figure 2: **Assessment of complication rates in our population**.

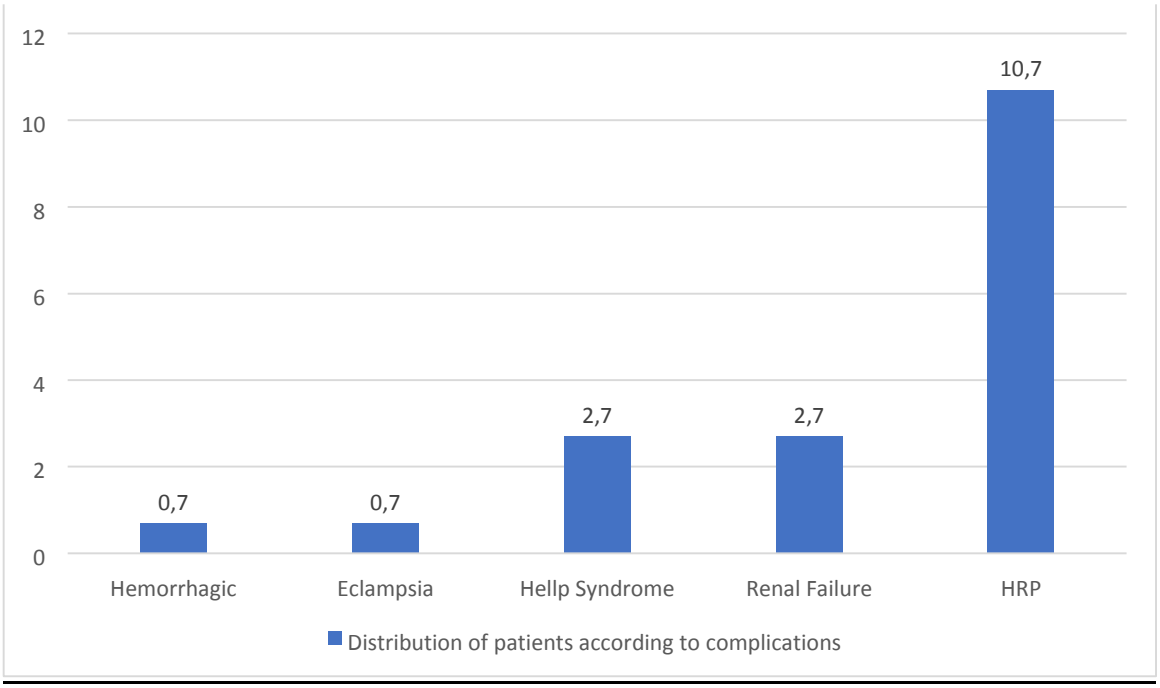

Figure 3: **Distribution of patients according to complications.**

The area under the ROC curve of PIERS score performance in our population was 0.61.

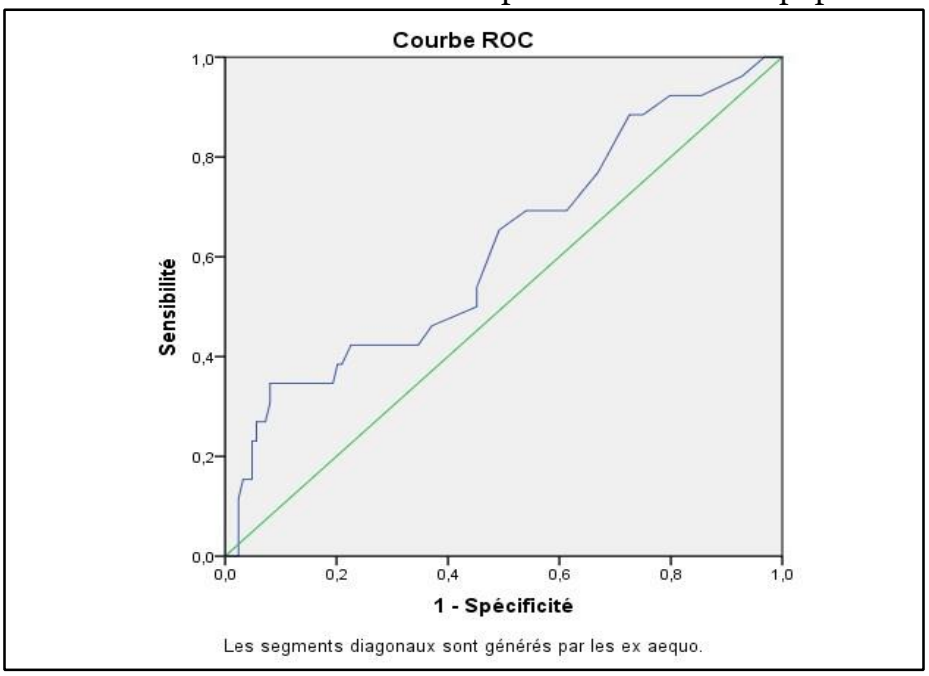

Figure 4: **ROC curve analysis of PIERS score performance.**

We estimated an optimal threshold of 1.05 above which included patients were considered at risk of severe pre-eclampsia complications.

This threshold resulted in a test with a sensitivity of 65% and a specificity of 50%.

Discussion:

Pre-eclampsia is a major public health problem worldwide. It complicates 2.5-7% of pregnancies and is a leading cause of maternal and neonatal morbidity and mortality [1].

Its incidence in most countries is between 2% and 5% of live births, with a prematurity rate of up to 60% and significant geographical disparities. [2] Pre-eclampsia and its complications are among the leading causes of maternal and fetal death. In our series, the complication rate was 17.3%.

In our study, we found an AUC of 0.61 for the prediction of maternal complications at 48 hours.

In the landmark study, Dadelszen et al. in 2010 assessed the risk of maternal complications secondary to pre-eclampsia within 48 hours of admission. A total of 2023 patients were included between September 2003 and January 2010, of whom 261 (13%) had a maternal pre-eclampsia-related complication at any time. [3] Patients with a complication were those with a disturbed laboratory work-up, including hyperuricemia, hepatic cytolysis and thrombocytopenia.

The FUllPIERS score was a good predictor of maternal events at 48 hours with an AUC of 0.88 (95% CI [0.84-0.92]). It also performed well for complications that could occur within 2 to 7 days with an AUC > 0.7 [3].

In 2014, the external validity of this model was tested for patients from developing countries (Fiji, South Africa, Brazil, Pakistan, Uganda) and based on clinical signs only [4]. The aim was to provide a "miniPIERS" test that would identify patients at high risk of death or severe hypertension that could predict major maternal complications. The variables included in the test were: parity, gestational age, headache or visual disturbance, dyspnoea or chest pain, metrorrhagia associated with abdominal pain, systolic blood pressure and proteinuria. The model was found to fit the data well with an AUC of 0.77 and a cut-off point of 3.2 for predicting complications at 48 hours.

This is a reasonable model to identify women at high risk of complications requiring either special care or transfer to a more appropriate maternity unit.

In 2018, U Viviane et all assessed the external and internal validity of the FULLPIERS model, using a combination of 3 different cohorts (BCW, PETRA and PREP) including respectively 218, 216 and 954 patients for a total of 1388 patients with early preeclampsia before 34 weeks' gestation.

The FULLPIERS model accurately predicted maternal complications with an AUC of 0.74 (95% CI 0.7 -> 0.79) within 7 days of hospitalisation compared with an AUC of 0.88 (95% CI 0.84 - 0.92) [5].

In 2018, M Boutot's team proposed an external validity of the FULLPIERS model from a single-centre retrospective study including 217 patients. The performance of the score was assessed at 48 hours and during the first days after admission.

This score predicted the occurrence of maternal events at 48 hours with an AUC of 0.80 (95% CI [0.74 - 0.85]), at 7 days the AUC was 0.74, which allows its validation and therefore its use in clinical practice [6].

Other studies are interested in determining the performance of the FULLPIERS model, for example the study by Cazarez et all carried out in February 2019.

This is a retrospective study excluding pre-eclampsia women with renal, hepatic or pulmonary insufficiency. This score has a positive predictive value of 59% and a negative predictive value of 95% for the detection of complications, which allows it to be used in routine practice [7].

Shubha et all [8] evaluated the performance of the FULLPIERS model for maternal risk prediction in February 2017. This study included 125 patients, divided into two groups, 4.87% of the low risk group developed complications versus 83.3% of the high risk group. This proves that it is a model with good positive and negative predictive value allowing its integration in the management of pre-eclampsia.

One of the strengths of our study is that there are very few attempts to externally validate this model.

It is a prospective study that respects the data collection modalities necessary for the calculation of the PIERS score over 48 hours to confront them with the occurrence of serious complications of pre-eclampsia from the established list.

Secondly, we have endeavoured to follow the same methodology as the original study in order to determine whether the performance of the FULLPIERS model is reproducible in our maternity hospital.

One of the weaknesses of our study is its uni-centric nature. This recruitment bias limits the number of cases studied and patients to be included, 250 patients were included compared to 2023 in the original study.

Our prospective and uni-centric study shows that the integration of a tool such as the PIERS score of the FULLPIERS model in a population such as the one in our maternity hospital, at high risk of developing serious complications of pre-eclampsia, does not seem relevant because it lacks sensitivity and specificity.

In our limited study sample, the PIERS score is not a "safe" test because it has a poor negative predictive value that does not allow us to ensure that a woman with a low score is not at risk of complications. Similarly, its positive predictive value is not satisfactory

and does not allow us to be certain that a woman with a high score will develop a complication of pre-eclampsia.

This can be explained by the fact that the FULLPIERS score does not address neonatal complications associated with pre-eclampsia, and some maternal complications such as eclampsia are not taken into account.

This is consistent with the results of the study by Adrian Rahou in 2013, which concluded that the integration of the FULLPIERS score in a population at high risk of developing severe complications of pre-eclampsia does not seem relevant, as it lacks sensitivity and specificity [9].

In the literature, we find few attempts to propose an external validation of the FULLPIERS model.

A study carried out at the Paule de Viguier maternity hospital, including 1,522 patients, with results that are generally consistent with the Von Dadelszen study, validates the score and its integration into the management of pre-eclampsia [10].

Conclusion:

This score is indeed not a "safe" test as it has a poor predictive value both negative and positive.

One of the weaknesses of our study is its unicentric nature, thus limiting patient recruitment. Nevertheless, other prospective, multicenter studies would be necessary to confirm and validate new practices.

Bibliography:

1. **Vidya Subramaniam.** Seasonal variation in the incidence of preeclampsia and eclampsia in tropical climatic conditions. BMC Women's Health 2007;7:18.
2. **Silvia Iacobelli, Francesco Bonsante & Pierre-Yves Robillard** . Preeclampsia and preterm birth in Reunion Island: a 13 years cohort based study. Comparison With international data . The Journal of Maternal-Fetal & Neonatal Medicine 2015 .
3. **Peter von Dadelszen, Beth Payne, Jing Li, J Mark Ansermino, Fiona Broughton Pipkin, et al** .Prediction of adverse maternal outcomes in preeclampsia: development and validation of the fullPIERS model .Lancet 2011; 377: 219-
27.
4. **Payne BA, Hutcheon JA, Ansermino JM, Hall DR, Bhutta ZA, et al.** A Risk Prediction Model for the Assessment and Triage of Women with Hypertensive Disorders of Pregnancy in Low-Resource Settings: The miniPIERS (Pre-eclampsia Integrated Estimate of RiSk) Multi-country Prospective Cohort Study. PLoS Med 2014;11(1):1001589.

5. **U. Vivian Ukah, Beth Payne, Jennifer A, et al.** Assessment of the fullPIERS Risk Prediction Model in Women With Early-Onset Preeclampsia.Hypertension 2018;71:00-00.

6. **M. Boutot , F. Margueritte, N. Boukeffa, P. Coste Mazeau, Y. Aubard, T.Gauthier .** External validation of the FullPIERS model in pre-eclampsia from a 4year French series. Gynécologie Obstétrique Fertilité' et Sénologie 2020 ;48 :167-173.

7. Ingrid América, Cazarez-Ávalos et all. Diagnostic performance of FullPIERS model as predictor of perinatal complications in patients with preeclampsia. Ginecol Obstet Mex. 2020 enero;88(1):1-7.

8. **Shubha Srivastava, Bharti Chaudhry Parihar, Neha Jain.** PIERS calculator- predicting adverse maternal outcome in preeclampsia. Int J Reprod Contracept Obstet Gynecol 2017 Apr;6(4):1200-1205 .

9. **Adrien Rahou.** External validation of the fullPIERS model in preeclamptic patients at the Port Royal maternity hospital who delivered in 2012 or 2013. Gynaecology and Obstetrics. 2015.

10. **Pascal ZEPHIR.** Prediction of an adverse maternal outcome within 48 hours of the diagnosis of pre-eclampsia. [THESIS]: Toulouse; 2014.