



# Role of fibrinogen–erythrocyte and erythrocyte–erythrocyte adhesion on cardiovascular pathologies

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To cite this article: Filomena A. Carvalho, Ana Filipa Guedes, Luís Sargento, J. Braz Nogueira, Nuno Lousada, Carlos Moreira & Nuno C. Santos (2021) Role of fibrinogen–erythrocyte and erythrocyte–erythrocyte adhesion on cardiovascular pathologies, *Annals of Medicine*, 53:sup1, S9–S10, DOI: [10.1080/07853890.2021.1896875](https://doi.org/10.1080/07853890.2021.1896875)

To link to this article: <https://doi.org/10.1080/07853890.2021.1896875>



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Published online: 28 Sep 2021.



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## References

- [1] Morris K. Thinking family? The complexities for family engagement in care and protection. *Br J Social Work*. 2012;42(5):906–920.
- [2] Morris K, Connolly M. Family decision making in child welfare: challenges in developing a knowledge base for practice. *Child Abuse Rev*. 2012;21(1):41–52.
- [3] Schreiber J, Fuller T, Pacey M. Engagement in child protective services: parent perceptions of worker skills. *Children Youth Serv Rev*. 2013;35(4):707–715.
- [4] Loman AL, Siegel GL. Neglect effects of approach and services under differential response on long term child safety and welfare. *Child Abuse Neglect*. 2015;39:86–97.
- [5] Fusco R. Second-generation mothers in the child welfare system: factors that predict involvement. *Child Adolesc Soc Work J*. 2015;32(6):545–554.
- [6] Thrana HM, Fauske H. The emotional encounter with child welfare services: the importance of incorporating the emotional perspective in parents' encounters with child welfare workers. *Eur J Social Work*. 2014;17(2):221–236.
- [7] Toros K, LaSala M. Estonian child protection workers' assessment perspectives: the need for competence and confidence. *Int Social Work*. 2018;61(1):93–105.
- [8] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International J Social Res Methodol*. 2005;8(1):19–32.
- [9] The Joanna Briggs Institute. Joanna Briggs Institute reviewers' manual; 2015 edition/supplement. South Australia: University of Adelaide, 2015.
- [10] Casillas KL, Fauchier A, Derkash BT, et al. Implementation of evidence-based home visiting programs aimed at reducing child maltreatment: a meta-analytic review. *Child Abuse Neglect*. 2016;53:64–80.
- [11] Glad J, Jergeby U, Gustafsson C, et al. Social worker and teacher apprehension of children's stimulation and support in the home environment and care-giver perception of the HOME inventory in Sweden. *Br J Social Work*. 2014;44(8):2218–2236.
- [12] Duffy JY, Hughes M, Asnes AG, et al. Child maltreatment and risk patterns among participants in a child abuse prevention program: a child abuse prevention program. *Child Abuse Neglect*. 2015; 44:184–193.
- [13] Donohue B, Pitts M, Chow G, et al. Development and initial psychometric examination of the home safety and beautification assessment in mothers referred to treatment by child welfare agents. *Psychological Assessment*. 2016;28(5):523–538.
- [14] Heino T. Child protection systems. *Trends Orient Int*. 2012;2(2):155–159.

DOI: 10.1080/07853890.2021.1896244

## Role of fibrinogen–erythrocyte and erythrocyte–erythrocyte adhesion on cardiovascular pathologies

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### ABSTRACT

Cardiovascular pathologies are the major cause of death worldwide. Erythrocyte aggregation is an indicator of cardiovascular risk, which is influenced by high plasma fibrinogen levels. Our main goals were to understand how fibrinogen–erythrocyte binding influences erythrocyte aggregation and how it constitutes a cardiovascular risk factor in essential arterial hypertension (EAH) and chronic heart failure (CHF).

Differences on cell stiffness, protein–cell interaction and cell–cell adhesion forces were evaluated by AFM-based force spectroscopy with cells from 31 EAH patients, 30 CHF patients and 15 healthy blood donors. The main procedures used were previously described by us [1–3]. Results were correlated with patients' clinical profiles.

From cell–cell adhesion studies, we concluded that, upon increasing fibrinogen concentration (from 0 to 1 mg/mL), there was an increase in the work and force necessary for erythrocyte–erythrocyte detachment on EAH patients and healthy donors. Nevertheless, higher values from both parameters were obtained for EAH patients, when comparing to healthy donors, at each fibrinogen concentration [4].

Fibrinogen–erythrocyte (un)binding forces were higher in EAH and in CHF patients, when compared with the control group, despite a lower binding frequency [5,6]. Ischaemic CHF patients showed increased binding forces compared to non-ischaemic patients. A 12-month clinical follow-up shows that CHF patients with higher fibrinogen–erythrocyte

binding forces, probed by AFM at the beginning of the assessment, had a significantly higher probability of being hospitalised due to cardiovascular complications, pointing out the value of AFM for clinical prognosis [5]. Erythrocyte stiffness studies revealed differences between patients and healthy donors, in terms of erythrocyte elasticity (Young's modulus) and AFM tip penetration depth into the cells [5,6]. Erythrocytes from non-ischæmic CHF patients presented a higher average stiffness than those from the other groups (ischæmic CHF and control). Nevertheless, a significantly higher cell penetration depth at the same applied force was observed for ischæmic CHF patients [5]. In conclusion, fibrinogen promotes erythrocyte adhesion, leading to its aggregation, probably by transient simultaneous binding of the protein to two cells, bridging them. Our results may be relevant for potential future drug interventions to reduce aggregation and enhance microcirculatory flow conditions in cardiovascular patients.

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## References

- [1] Carvalho FA, Connell S, Miltenberger-Miltenyi G, et al. Atomic force microscopy-based molecular recognition of a fibrinogen receptor on human erythrocytes. *ACS Nano*. 2010;4(8):4609–4620.
- [2] Carvalho FA, de Oliveira S, Freitas T, et al. Variations on fibrinogen-erythrocyte interactions during cell aging. *PLOS One*. 2011;6(3):e18167.
- [3] Ribeiro AS, Carvalho FA, Figueiredo J, et al. Atomic force microscopy and graph analysis to study the P-cadherin/SFK mechanotransduction signalling in breast cancer cells. *Nanoscale*. 2016;8(46):19390–19401.
- [4] Guedes AF, Carvalho FA, Moreira C, et al. Essential arterial hypertension patients present higher cell adhesion forces, contributing to fibrinogen-dependent cardiovascular risk. *Nanoscale*. 2017;9(39):14897–14906.
- [5] Guedes AF, Carvalho FA, Malho I, et al. Atomic force microscopy as a tool to evaluate the risk of cardiovascular diseases in patients. *Nature Nanotech*. 2016;11(8):687–692.
- [6] Guedes AF, Moreira C, Nogueira JB, et al. Fibrinogen–erythrocyte binding and hemorheology measurements in the assessment of essential arterial hypertension patients. *Nanoscale*. 2019;11(6):2757–2766.

DOI: 10.1080/07853890.2021.1896875

## Satisfaction with nursing care: influence of sociodemographic factors on a sample of hospitalised children

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### ABSTRACT

**Introduction:** Patient satisfaction is identified as an indicator of the right to health [1]. Traditionally, children's satisfaction with health care is not regularly accessed [2] however, in recent years, it has been increasingly studied [3]. This study aims to identify if sociodemographic factors, such as sex, age and reason for hospitalisation, influences satisfaction with nursing care, in a sample of school-aged children (7–11 years).

**Materials and methods:** An observational, cross-sectional, exploratory-descriptive study with a non-probabilistic and accidental sample was performed. Data were collected through the "Children Care Quality at Hospital" instrument, after translation and validation to Portuguese. The instrument includes three domains: nurse characteristics, nursing activities and nursing environment. Also, children were asked to rate global satisfaction with nursing care from 1 (less satisfied) to 5 (more satisfied). Statistical analysis was performed using SPSS statistical tool (version 24.0). Authorisation was obtained from National Data Protection Commission as well as ethics committees in each of the 6 health institutions where the study was applied.

**Results:** The sample ( $n = 252$ ) includes mainly boys (52.8%,  $n = 133$ ) with 8.9 years ( $SD = 1.4$ ) as mean age and most children had unscheduled admissions (84.6%;  $n = 209$ ). Global nursing care (1–5) was rated with a score of 4.51 ( $SD = 0.645$ ). There was no significant difference between sex ( $t = -0.86$ ;  $p > .05$ ), age ( $r_s = -0.49$ ;  $p > .05$ ) or scheduled/unscheduled admissions ( $t = -0.59$ ;  $p > .05$ ) and the score attributed by children.

**Discussion and conclusions:** In this sample, school-aged children are satisfied with nursing care provided during hospitalisation. Sociodemographic factors seem to have effect on overall satisfaction in previous studies with better scores of satisfaction in: older patients [4], male patients [4,5] and unscheduled admissions [6]. Nevertheless, this was not verified in our sample. We suggest that further studies should be developed with larger samples and different group age.

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