Frequency of Subclinical Atherosclerosis in Patients of Psoriasis

Sobia Awan, Asma Kiyani*, Pooner Fiaz Aman*, Syeda Midhat Fatima**, Abdul Hameed Siddiqui***, Farid-ur-Rehman*

Abbas Institute of Medical Sciences (AIMS) Muzaffarabad, Azad Jammu & Kashmir Pakistan, *Fauji Foundation Hospital, Rawalpindi, Pakistan, **Shifa International Hospital Islamabad Pakistan, ***Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD)/National University of Medical Science (NUMS), Rawalpindi, Pakistan

ABSTRACT

Objective: To find out how common subclinical atherosclerosis is in psoriasis patients.

Study Design: Descriptive cross-sectional study

Place and Duration of Study: Dermatology unit of Fauji Foundation, Rawalpindi Pakistan, from Jan 2020 to Jun 2020.

Methodology: After receiving informed consent, 314 cases that met the selection criteria were enrolled. Psoriasis was diagnosed depending on physical examination the family history of patients. Ultrasonography high-resolution B mode was opted to assess carotid atherosclerosis (Xario color Doppler probe frequency 5 to 7mHZ.). If the (IMT) was less than 0.9mm, it was regarded normal; values greater than 0.9mm were termed thickened intima, while digits greater than 1.5mm were considered atherosclerotic plaque. SPSS version 21.0 was used for data analysis.

Results: Age of patients was from 18 to 70 years old, with a Mean±SD (44.00 ±12.12) years. Males made up 47(15%) of the population, while females made up 267(85%). There were 33(10.5%) smokers and 281(89.5%) non-smokers. The mean IMT was 0.84±0.61, with 0.1mm and 2.05mm as the minimum and maximum, respectively. Subclinical atherosclerosis was found in 96 patients (30.6%) ($p<0.05$). SPSS 21 was used to enter and evaluate the data. Age, BMI, IMT, and disease duration were all expressed as a Mean±SD. Other parameters like gender, smoking, subclinical atherosclerosis be measured by frequency and percentage.

Conclusion: Subclinical atherosclerosis is significantly higher in patients of psoriasis. Early detection and management can help to reduce risks of cardiovascular complications.

Keywords: Atherosclerosis, Intima, Psoriasis.

INTRODUCTION

Chronic immune-mediated skin condition characterized by keratinocyte hyper proliferation and decreased differentiation,[1] is psoriasis. The prevalence of this disease is almost 2-3% of global population. Cardiovascular diseases (CVD), diabetes, hypertension, hyperlipidemias, metabolic syndrome malignancies, psychiatric illnesses and inflammatory bowel disease are more widespread in patients with psoriasis than universally.[2] Psoriasis is an inflammatory skin condition caused by the immune system that has no known cause and requires lifelong therapy. It's classified as a systemic seditious sickness with an amplified risk of heart problems.[3,4] The aetiology of psoriasis is influenced by Th-1, Th-17, and Th-22 mediated responses.[5,6] Psoriasis is characterized by an increase in the rate of epidermal cell turnover and excessive proliferation of keratinocytes in the epidermis. The cause of the lack of keratinocyte turnover control is unknown. Environmental, genetic, and immunologic factors, on the other hand, appear to play a role. These

pathways stimulate acute and chronic inflammation in development of autoimmune disorders.[6]

Psoriasis is associated to a higher risk of CVD at an early age, which is not detected by conventional predictors of the disease. Ultrasound screening for atherosclerosis has only been considered in the carotid arteries. One of the several screening techniques that can discover persons at risk of atherosclerosis is carotid artery IMT readings. The thickness of two layers of the artery wall, is measured by intima–media thickness (IMT), also known as intimal medial thickness. External ultrasonography and, on rare occasions, internal, invasive ultrasound catheters are used to make the measurement. Increased IMT in the common carotid artery (CCA) is a sign of atherosclerosis in general.[4,7] A study conducted 2013, revealed that 28.6% patients had subclinical atherosclerosis in patients who were diagnosed cases of psoriasis with vascular endothelial dysfunction ion, raised IMT and coronary artery calcification.[8]

The primary diagnosis of SC atherosclerosis and the implementation of basic prevention interventions in these patients may reduce the danger of CAD.

Correspondence: Dr Sobia Awan, Abbas Institute of Medical Sciences (AIMS) Muzaffarabad AJK, Pakistan

Psoriasis patients should be screened for atherosclerosis, stressing the need for a non operative procedure for this reason.[9]

Psoriasis patients had a higher risk of MI at an early age as compare to people who have typical CVD predictors.[10,11] This reccomends that additional predictors may be present in these patients' early stages of atherosclerosis. It is hypothesized that the pathogenic connection between psoriasis and accelerated atherogenesis may be the incidence of insulin resistance, a well-known CVD predictors,[12] that is strongly linked with psoriasis,[13,14] and other chronic situation, depending on earlier reports on a link between psoriasis and an amplified danger of (DM-2).[15,16] However, it is indistinguishable whether this boost in CVS death is due only to CVS predictors. Some studies have demonstrated a reduced vascular endothelial role in Psoriasis patients, and it has been suggested that early onset of atherosclerosis linked to Psoriasis could be one of the reasons for augmented (CVD) hazard.[17]

The (IMT) of the carotid arteries was once thought to be a marker for atherosclerosis, however it has now been exposed to be a poor predictor of cardiovascular burden. The IMT is not constantly related to atherosclerosis, and it never progress the standard risk score's predictive capacity significantly.[18]

Because no data on the incidence of subclinical atherosclerosis in these individuals is available in the local population, this research was planned to find out the rate of atherosclerosis. This will aid into early detection, or treatment to reduce the risk of cardiovascular disease.

METHODOLOGY

This was a descriptive cross-sectional study carried out in Dermatology unit of Fauji Foundation Hospital, Rawalpindi Pakistan.

Sample Size: The calculated sample size was 314 by using anticipated percentage of 28.5%,[16] (CI; 95%, margin of error; 5%) .After receiving approval from the hospital's ethical and scientific council (Ltr# 19/6/FFH/2017).

Inclusion Criteria: Patients of all ages, either sex were included. Psoriasis was diagnosed after clinical history and examination.

Exclusion Criteria: Patients with diabetes mellitus, hypertension, dyslipidemia, hypothyroidism, chronic liver disease, ischemic heart disease, stroke and obese patients (BMI > 25.9) were excluded.

The study's goal was briefed to the patients, while they signed a informed consent form for permission. A complete medical history was taken, including information on the average time spent with psoriasis and smoking habits. Participants' height, weight were measured, and their body mass index was calculated. IMT was recorded in a supine pose with the neck comprehensive and curved slightly to the contralateral side by a concerned worker with >5 years of practice after post graduation. Ultrasonography high-resolution standard B mode was opted to assess carotid atherosclerosis (Xario color Doppler frequency 5 to 7mHZ). The space amid the lumen–intima and media– adventitia margin of the artery wall was opted to calculate the carotid (cIMT).

Three cIMT measurements were taken:

- Near and far wall of the left and right common carotid arteries.
- Bifurcation of Carotid artery.
- Internal carotid artery.

The values of maximum IMT measured from 12 pre-selected segments in the carotid arteries were taken and mean maximum cIMT was calculated.IMT was considered normal when ≤0.9mm, values>0.9mm was indicative of thickened intima and value >1.5mm was considered to be indicative of atherosclerotic plaque.

SPSS 21 was used to enter and evaluate the data. Age, BMI, IMT, and disease duration are all quantitative variables and was given in Mean±S.D. other variables i.e, gender; smoking, subclinical atherosclerosis were calculated as n(%). Data for age, BMI, males, females, smokers and duration of disease was used to tackle the statistical effects. Comparsion was made by Chi-square test. p-value <0.05 was considered as statistically significant.

RESULTS

Out of 314 patients the average age was 44.00±12.12 years (range 18 and 70 yrs). 138(43.9%) patients were between 18-40 while 176(56.1%) were 41-70 years. 47(15%) were male while 267(85%) were female. 33(10.5%) were smokers and 281(89.5%) were non-smokers. The mean weight, height and BMI were 73.20±16.78kg, 1.80±0.18m and 22.42±2.95 respectively. 42(13.4%) had

BMI<18.5 while 272(86.6%) had BMI 18.5-25.9.The average duration of disease was 6.48±3.31 months with minimum and maximum duration as 1 and 12 months (Table-I).

MISCELLANEOUS

Table-I: Anthropometric and Clinical data for Psoriasis Patients (n=314)

Variable	Mean±SD/ n (%)
Age (years)	44.01±12.1
Mean intima thickness (mm)	0.84±0.61
BMI (kgm^{-2})	22.42±2.95
<18.5	42(13.4%)
18.5-25.9	272(86.6%)
Smokers	33(10.5%)
Non-smokers	281(89.5%)
Gender	
Male	47(15.0%)
Female	267(85.0%)

Out of total 314 study participants, 96(30.6%) cases had subclinical atherosclerosis (p=0.001).

Table. II: Comparison of Atherosclerosis with gender and smoking status of patients (n=96)

Variables		Atherosclerosis	p-value
Gender	Male	5(5.208%)	0.001
	Female	91(94.79%)	
Smoking	Yes	6(6.25%)	0.114
	No	90(93.75%)	

The mean intima media thickness was 1.7017±0.659 mm with minimum and maximum Intima media thickness as 0.1mm and 2.05mm (Table-III).

Table-III: Association of Atherosclerosis with risk factors (n=96)

Variables	Atherosclerosis (Mean±SD)	p–value
Age	43.365±12.1258	0.536
Height	1.7946±0.17706	0.614
Weight	72.479±16.610	0.661
BMI*	22.348±2.8487	0.779
IMT*	1.7017±0.1659	<0.0001

Key finding is that screening increases the diagnosis of subclinical atherosclerosis in psoriatic patients. Insulin resistance may be a more important predictor of SC atherosclerosis in these patients than traditional CVD predictors, but gender plus age show significant associations (Figure-1).
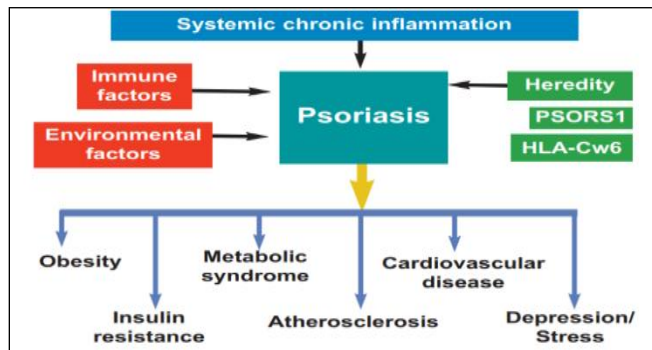

Figure-I: Clinical contributing factors, causes and effects of psoriasis

DISCUSSION

Many people suffer with psoriasis, a chronic inflammatory skin disease. Its aetiology is largely influenced by dendritic cells, tumor necrosis factor alpha, and T lymphocytes. Psoriasis has been linked to an elevated risk of cardiovascular disease in recent studies.[19,20] According to studies, having severe psoriasis is linked to a 57 percent increased risk of cardiovascular death, which is especially significant in young people with the illness. The early athero-sclerosis associated with psoriasis has been proposed as one of the explanations of elevated cardiovascular disease risk. Vascular inflammation has been shown to be a critical factor in the development of the immu-noinflammatory disease known as atherosclerosis, which affects arteries of all sizes. Atherosclerosis is an immunoinflammatory disease that affects arteries of all diameters, and research shows that vascular inflam-mation is a crucial factor in the disease's progression.[21] Systemic inflammation in psoriasis, like other inflam-matory illnesses like rheumatoid arthritis, has been shown to change the vascular endothelium.[22] Accor-ding to multiple clinical investigations, psoriasis pa-tients experienced vascular endothelial dysfunction, elevated IMT, and coronary artery calcification. The amount and prevalence of subclinical atherosclerosis in psoriasis patients, however, are unknown.[1] Endothelial dysfunction and carotid IMT have been suggested as important markers of subclinical atherosclerosis.[1]

Nonspecific triggers for psoriasis include mode-rate trauma (scratching, piercings, and tattoos), sun-burn, and chemical irritants. Blockers, lithium, antimalarial, and no steroidal anti-inflammatory medi-cations are examples of systemic drugs that might exacerbate the illness. Some of the more common potential triggers include stress, skin injury, a strepto-coccal infection, certain drugs, and sunlight. Antima-larial medicines, beta-blockers, and lithium are among medications that can cause psoriasis.[23,24]

Previous research on using ultrasound pictures to diagnose subclinical atherosclerosis in these patients focused only on the carotid arteries, using IMT first and then looking for atherosclerotic plaques. However, there were mixed results, in another research indicating greater rate of carotid plaques in psoriasis patients as compare to those with no disease,[25] and two investigations reporting no major dissimilarity in plaque dominance between groups.[26] Similar findings were found in our study as well, with the exception that IMT was employed for diagnosis.

Yiu *et al*.[8] has performed cross-sectional study, rate and severity of coronary and carotid athero-sclerosis were studied in 51 yrs and gender-matched healthy participants (457% male) and 70 psoriasis patients (469% of them were men) without identified CVD or involvement of joint. The age distribution be similar to present study. The higher female ratio in our study is attributed to the fact that FFH is a trusted institute providing services to ex-servicemen wives, unmarried daughters and sons below 18 yrs.

Evensen *et al*.[27] performed the study of (IMT), plaque prevalence, stenosis of the arteries were assessed as indications of cardiovascular disease in psoriasis patients Vs healthy individuals. Patients had higher intima media thickness values than healthy participants: 0.71 ± 0.17 vs.0.59 ± 0.08; $p < 0.001$. The difference became substantial ($p = 0.04$) when recognized atherosclerotic risk factors were taken into account. Carotid plaques has been found to be widespread in psoriasis cases 13 (21%) than in controls 1 (3%), which is similar to the current study.

Yiu *et al*.[8] Reported almost similar statistics i.e., When compared to controls, there was a larger A superior level of atherosclerosis as defined by the average CCS (67.4 ± 349.2 Vs. 0.5 ± 3.0, $p < 0.05$) and a increased rate of atherosclerosis (CCS > 0; 28.6 % Vs. 3.9%,$p < 0.01$). Patients with psoriasis exhibited substantially greater cIMT than healthy individuals (0.73 ± 11 Vs. 0.6 ± 08, $p < 0.01$).

Kimhi O *et al*,[28,29] used (IMT) of the widespread carotid artery to measure degree of SC atherosclerosis in individuals having had psoriatic arthritis, found vascular menace variables related with psoriatic arthritis. The common carotid IMT was measured using carotid duplex scanning. After controlling for variables including age, gender, BMI, HTN, hyperlipidemia, PsA patients showed a greater IMT (mean standard deviation) than healthy participants (0.76 ± 0.11 Vs 0.64 ± 0.27, $p < 0.00001$). As in psoriatic illness, irritative triggers such as lipid imbalances or systemic inflammation might trigger this process.[18,28-29] endothelial dysfunction, as determined by functional ultrasonography investigations of the brachial artery, is common, according to several research (e.g. flow-mediated dilation), Psoriasis and PsA patients showed elevated rate of Psoriasis, PsA patients showed upper levels of Psoriasis and Psoriatic arthritis individuals showed elevated levels of the intima and medial thickness of the arteries are measured using high-resolution carotid ultrasonography; numerous studies have shown a

relationship between increasing thickness and atherosclerosis. In our research, we found a related finding. In patients with other, more conventional CVD risk factors, IMT is an independent risk factor for MI and stroke.[31] This study found tha atherosclerosis and PSO were significantly correlated exclusively in PSO patients with CVS risk factors. In patients without any CVS risk predictors, there was no significant correlation, suggesting that the correlation may have been caused by the clustering of CVS predictors.

Innovative methods for measuring subclinical atherosclerosis, i.e., coronary artery calcification, have lately gained prominence. In 2017, Geisel *et al*. compared the extrapolative rate of CAC, CIMT, and ankle-brachial index to distinguish which of the three markers enhanced CV risk prediction . The study found that CAC, particularly in the intermediate-risk group, provides the best risk discrimination when compared to CIMT and ABI, but CIMT may be a different measure for reassurance in the low-menace strata.[32] only one diagnostic marker, IMT, was used in our investigation. Recent diagnostics, on the other hand, may yield superior findings.

To conclude, an illness that is immune-inflammatory is atherosclerosis. that affects artery of various diameters, numerous researches have shown that vascular tenderness plays an important part in the progression of atherosclerosis. The ultrasound examination of the femoral arteries may help detect SC atherosclerotic problem in infected participants, however examination in arteries may not be as reliable.

LIMITATIONS OF STUDY

The study's drawbacks include the limited sample size, yet it was found that participants could be classified into separate groups with sufficient statistical power. Further research is needed to confirm this conclusion in larger groups of patients and healthy group. Additionally, as it was a descriptive research, it was not feasible to judge the past records or clinical outcomes of disease.

CONCLUSION

Psoriasis patients have considerably more subclinical atherosclerosis ($p < 0.05$). Early detection of subclinical atherosclerosis in psoriasis patients can be improved by femoral artery screening, which can aid in the management of cardiovascular disease risks. More investigations may be required to better recognize the system underlying connection and create improved methods for reducing CV mortality.

ACKNOWLEDGEMENT

MISCELLANEOUS

REFERENCES

1. Cai Y, Fleming C. New insights of T cells in the pathogenesis of psoriasis. Cell Molecul Immunol 2012; 9(4): 302-309.
2. Gisondi P, Galvan A, Idolazzi L, Girolomoni G. Management of Moderate to Severe Psoriasis in Patients with Metabolic Comorbidities. Frontiers in Medicine 2015; 2(1): 1.
3. Ni C, Chiu MW. Psoriasis and comorbidities: links and risks. Clin Cosmet Investig Dermatol 2014; 7: 119-132.
4. Elsheikh RG, Amin TE-S, El-Ashmawy AA, Abdalla SIAE-f. Evaluation of subclinical atherosclerosis in Egyptian psoriatic patients. J Saudi Heart Assoc 2014; 26(2): 63-71.
5. Kagami S, Rizzo HL, Lee JJ, Koguchi Y, Blauvelt A. Circulating Th17, Th22, and Th1 cells are increased in psoriasis. J Investigat Dermatol 2010; 130(5): 1373-1383.
6. Tabarkiewicz J, Pogoda K, Karczmarczyk A, Pozarowski P, Giannopoulos K. The Role of IL-17 and Th17 Lymphocytes in Autoimmune Diseases. Arch Immunol et Therapiae Experiment 2015; 63: 435-449.
7. Balta I, Balta S, Karademir I, Demirkol S, Ozturk C, Celik T, et al. Subclinical atherosclerosis in patients with psoriasis. J Saudi Heart Assoc 2015; 27(3): 222-223.
8. Yiu KH, Yeung CK, Zhao CT, Chan J, Siu CW, Tam S, et al. Prevalence and extent of subclinical atherosclerosis in patients with psoriasis. J Internal Med 2013; 273(3): 273-282.
9. Lerman JB, Joshi AA, Chaturvedi A, Aberra TM, Dey AK, Rodante JA, et al. Coronary plaque characterization in psoriasis reveals high-risk features that improve after treatment in a prospective observational study. Circulation 2017; 136: 263–276.
10. Gelfand JM, Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB, et al. Risk of myocardial infarction in patients with psoriasis. JAMA 2006; 296: 1735–1741. 10.1001/jama.296.14.1735
11. Mehta NN, Azfar RS, Shin DB, Neimann AL, Troxel AB, Gelfand JM, et al. Patients with severe psoriasis are at increased risk of cardiovascular mortality: Cohort study using the general practice research database. Eur Heart J 2010; 31: 1000–1006.
12. Eddy D, Schlessinger L, Kahn R, Peskin B, Schiebinger R. Relationship of insulin resistance and related metabolic variables to coronary artery disease: a mathematical analysis. Diabetes Care 2009; 32(2): 361–366. 10.2337/dc08-0854
13. Qureshi AA, Choi HK, Setty AR, Curhan GC. Psoriasis and the risk of diabetes and hypertension: a prospective study of US female nurses. Arch Dermatol 2009; 145: 379–382.
14. Wan MT, Shin DB, Hubbard RA, Noe MH, Mehta NN, Gelfand JM, et al. Psoriasis and the risk of diabetes: A prospective population-based cohort study. J Am Acad Dermatol 2018; 78: 315–322. e1. 10.1016/j.jaad.2017.10.050
15. Boehncke S, Thaci D, Beschmann H, Ludwig RJ, Ackermann H, Badenhoop K, et al. Psoriasis patients show signs of insulin resistance. Br J Dermatol 2007; 157: 1249–1251. 10.1111/j.1365-2133.2007.08190
16. Karadag AS, Yavuz B, Ertugrul DT, Akin KO, Yalcin AA, Deveci OS, et al. Is psoriasis a pre-atherosclerotic disease? Increased insulin resistance and impaired endothelial function in patients with psoriasis. Int J Dermatol 2010; 49: 642–664. 10.1111/j.1365-4632.2009.04358
17. Sánchez-Pérez H, Tejera-Segura B, de Vera-González A, González-Delgado A, Olmos JM, Hernández JL, et al. Insulin resistance in systemic lupus erythematosus patients: contributing factors and relationship with subclinical atherosclerosis. Clin Exp Rheumatol 35: 885–892.
18. Gonzalez-Gay MA, Gonzalez-Juanatey C, Vazquez-Rodriguez TR, Miranda-Filloy JA, Llorca J, et al. Insulin resistance in rheumatoid arthritis: the impact of the anti-TNF-alpha therapy. Ann N Y Acad Sci 2010; 1193: 153–159. 10.1111/j.1749-6632.2009.05287
19. Griffiths CE, Barker JN. Pathogenesis and clinical features of psoriasis. Lancet 2007; 370(9583): 263-271.
20. Gelfand JM, Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB. Risk of myocardial infarction in patients with psoriasis. J Am Med Assoc 2006; 296(14): 1735-1741.
21. Wakkee M, Thio H, Prens E, Sijbrands E, Neumann H. Unfavorable cardiovascular risk profiles in untreated and treated psoriasis patients. Atherosclerosis 2007; 190(1): 1-9.
22. Mehta NN, Azfar RS, Shin DB, Neimann AL, Troxel AB, Gelfand JM, et a'. Patients with severe psoriasis are at increased risk of cardiovascular mortality: cohort study using the General Practice Research Database. Eur Heart J 2009; 31(8): 1000-1006.
23. Brauchli YB, Jick SS, Miret M, Meier CR. Psoriasis and risk of incident myocardial infarction, stroke or transient ischaemic attack: an inception cohort study with a nested case–control analysis. Br J Dermatol 2009; 160(5): 1048-1056.
24. De Simone C, Di Giorgio A, Sisto T, Carbone A, Ghitti F, Tondi P, et al. Endothelial dysfunction in psoriasis patients: cross-sectional case-control study. Eur J Dermatol 2011; 21(4): 510-514.
25. Ruggiero D, Paolillo S, Della Ratta G, Mariniello A, Formisano T, Pellegrino AM, et al. Endothelial function as a marker of pre-clinical atherosclerosis: assessment techniques and clinical implications. Monaldi Arch Chest Dis 2015; 80(3): 106-110
26. Evensen K, Slevolden E, Skagen K, Rønning OM. Increased subclinical atherosclerosis in patients with chronic plaque psoriasis. Atherosclerosis 2014; 237(2): 499-503.
27. Kimhi O, Caspi D, Bornstein NM, Maharshak N, Gur A.. Prevalence and risk factors of atherosclerosis in patients with psoriatic arthritis. Semin Arthritis Rheum 2007; 36(4): 203-209.
28. Tabas I, Williams KJ, Borén J. Subendothelial lipoprotein retention as the initiating process in atherosclerosis. Circulation 2007; 116(16): 1832-1844.
29. Yilmazer B, Sahin T, Unlu BÖ, Kir HM, Cefle A. Investigation of subclinical atherosclerosis in psoriatic arthritis patients with minimal disease activity. Rheumatol Int 2015; 35(8): 1385-1392.
30. Basavaraj KH, Ashok NM, Rashmi R, Praveen TK. The role of drugs in the induction and/or exacerbation of psoriasis. Int J Dermatol 2010; 49(12): 1351-1361.
31. Eder L, Zisman D. Subclinical atherosclerosis in psoriatic arthritis: a case-control study. J Rheumatol 2008, 35: 877-882.
32. Geisel MH, Bauer M, Hennig F, et al.: Comparison of coronary artery calcification, carotid intima-media thickness and ankle-brachial index for predicting 10-year incident cardiovascular events in the general population. Eur Heart J 2017; 38(1): 1815-1822. 10.1093/eurheartj/ ehx120

....