



Short communication

Variations in cardiovascular risk factors in people with and without migration background in Germany – Results from the STAAB cohort study



Caroline Morbach ^{a,1}, Götz Gelbrich ^{b,1}, Theresa Tiffe ^{b,1}, Felizitas Eichner ^{b,1}, Martin Wagner ^{b,1}, Peter U. Heuschmann ^{c,1,2}, Stefan Störk ^{a,*,1,2},
On behalf of the STAAB consortium, S. Frantz ^d, C. Maack ^e, G. Ertl ^f, M. Fassnacht ^g, C. Wanner ^h, R. Leyh ⁱ, J. Volkmann ^j, J. Deckert ^k, H. Faller ^l, R. Jahns ^m

^a Comprehensive Heart Failure Center and Dept. of Medicine I, University Hospital and University of Würzburg, Germany

^b Institute of Clinical Epidemiology and Biometry and Comprehensive Heart Failure Center, University of Würzburg, Germany

^c Institute of Clinical Epidemiology and Biometry, Comprehensive Heart Failure Center, and Clinical Trial Center, University of Würzburg, Germany

^d Dept. of Medicine I, Div. of Cardiology, University Hospital Würzburg, Germany

^e Comprehensive Heart Failure Center, University Hospital and University of Würzburg, Germany

^f University Hospital Würzburg, Germany

^g Dept. of Medicine I, Div. of Endocrinology, University Hospital Würzburg, Germany

^h Dept. of Medicine I, University Hospital Würzburg, Germany

ⁱ Dept. of Cardiovascular Surgery, University Hospital Würzburg, Germany

^j Dept. of Neurology, University Hospital Würzburg, Germany

^k Dept. of Psychiatry, Psychosomatics and Psychotherapy, Center of Mental Health, University Hospital Würzburg, Germany

^l Dept. of Medical Psychology, University of Würzburg, Germany

^m Interdisciplinary Bank of Biomaterials and Data Würzburg, University Hospital Würzburg, Germany

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ABSTRACT

Background: About 20% of the German population have a migration background which might influence prevalence of preventable cardiovascular risk factors (CVRF).

Methods: We report data of the prospective *Characteristics and Course of Heart Failure Stages A-B and Determinants of Progression (STAAB) cohort study* investigating a representative sample of inhabitants of the City of Würzburg, Germany, aged 30 to 79 years. Individuals without migration background were defined as follows: German as native language, no other native language, and/or born in Germany. All other participants were defined as individuals with migration background.

Results: Of 2473 subjects (51% female, mean age 54 ± 12 years), 291 (12%) reported a migration background: $n = 107$ (37%) from a country within the EU, $n = 117$ (40%) from Russia, and $n = 67$ (23%) from other countries. Prevalence of hypertension, atherosclerotic disease, and diabetes mellitus was similar in individuals with and without migration background. By contrast, prevalence of obesity and metabolic syndrome was significantly higher in individuals with migration background, with the least favourable profile apparent in individuals from Russia (individuals without vs. with migration background: obesity 19 vs. 24%, $p < 0.05$; odds ratio: EU: 1.6, Russia: 2.2*, other countries: 0.6; metabolic syndrome 18 vs. 21%, $p < 0.05$; odds ratio: EU: 1.2, Russia: 1.7*, other countries: 1.5; * $p < 0.05$).

Conclusion: Individuals with migration background in Germany might exhibit a higher CVRF burden due to a higher prevalence of obesity and metabolic syndrome. Strategies for primary prevention of heart failure may benefit from deliberately considering the migration background.

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* Corresponding author at: Comprehensive Heart Failure Center Würzburg, Am Schwarzenberg 15, D – 97078 Würzburg, Germany.

E-mail address: Stoerk_S@ukw.de (S. Störk).

¹ This author takes responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

² Both authors contributed equally.

1. Introduction

About 20% of the current population in Germany feature a migration background according to the definition of the statistical federal office (Statistisches Bundesamt) comprising individuals who himself or one of his parents are without German citizenship by birth [1,2]. It is well

acknowledged that differences regarding the cultural, religious, and linguistic background may affect health behaviour and health status between people with and without migration background in various ways like exercise, dietary and smoking habits, differential access to and use of health services, and protective health-related behaviour [3–6]. There is only limited information in Germany for individuals with migration background regarding the differential health situation and prevalence of cardiovascular risk factors (CVRF) [7]. As CVRF have major importance for accelerated cardiovascular disease including myocardial infarction, heart failure, stroke, and peripheral arteriosclerosis, differences in risk factor prevalence may require alternative primary prevention strategies in people with migration background.

We therefore investigated the profile of CVRF in individuals with and without migration background in a representative sample of the general population without clinical evidence for heart failure.

2. Methods

This report is based on a prospectively planned interim analysis of the *Characteristics and Course of Heart Failure Stages A-B and Determinants of Progression* (STAAB) Cohort Study. A random sample of residents of the City of Würzburg (source population 124,297 inhabitants as of 2011 census) was drawn in November 2013 from the local registration office with predefined age and sex strata with ratios 1:1 for sex, and 10:27:27:27:10 for age groups of 30–39, 40–49, 50–59, 60–69, and 70–79 years, respectively. The only exclusion criterion was self-reported evidence for heart failure [8]. Participants recruited until December 2016 were analysed for the current report ($n = 2473$). The STAAB cohort study complies with the Declaration of Helsinki. The study protocol and procedures received positive votes from the Ethics Committee of the Medical Faculty (vote 98/13) and the data protection officer of the University of Würzburg (J-117.605-09/13). All participants provided written informed consent prior to any study examination [8].

Participants were investigated at the Joint Survey Unit of the Comprehensive Heart Failure Center (CHFC) and the Institute of Clinical Epidemiology and Biometry (ICE-B) of the University of Würzburg, Germany according to standard operating procedures [8].

Cardiovascular risk factors were defined according to current recommendations: hypertension = blood pressure $\geq 140/90$ mm Hg [9] or anti-hypertensive pharmacotherapy; obesity = body mass index >30 kg/m² [10]; diabetes mellitus = HbA1c $>6.5\%$, fasting plasma glucose >7.0 mmol/L or 2 h-plasma glucose >11.1 mmol/L [11] or anti-diabetic medication; ever smoked = current or ex-smoker, metabolic syndrome [12] (≥ 3 of the following: 1) waist circumference ≥ 102 cm (males (m))/ ≥ 88 cm (females (f)), 2) triglycerides ≥ 1.7 mmol/L or on medication for high triglycerides, 3) high density lipoprotein <40 mg/dL (m)/ <50 mg/dL (f) or lipid modifying drug, 4) systolic BP ≥ 130 mm Hg or diastolic blood-pressure ≥ 85 mm Hg, 5) fasting blood glucose ≥ 6.1 mmol/L).

Individuals without migration background were defined as follows: German as native language, no other native language, and/or born in Germany. All other participants were defined as individuals with migration background.

2.1. Data analysis

Differences between participants with and without migration background are presented adjusted for age and sex as odds ratio (for frequencies) or mean difference (Δ or geometric mean ratio for continuous variables), each with 95% confidence interval (CI). Additional adjustment was carried out for the income category (below or above median) in order to examine the influence of this potential confounder. If significant at the 5% level ("1" is not in the 95% CI for OR or GMR; "0" is not in the 95% CI for Δ), mean effects were displayed separately in subgroups originating from a country of the European Union (EU), Russia, or other countries including "unspecified".

3. Results

Out 2473 subjects (response rate 32%), 291 (12%) reported a migration background, 2168 (88%) no migration background and 14 (0.006%) did not provide this information. The origin of participants with migration background was: 107 (37%) EU country, 117 (40%) Russia, 41 (14%) another country, and 26 (9%) did not specify. Of both individuals with and without migration background, 51% were female, but individuals with migration background were younger (mean age 51 ± 11 vs. 55 ± 12 years, $p < 0.001$).

Obesity and metabolic syndrome were significantly more prevalent in individuals with migration background when compared to individuals without migration background (Table 1). Prevalence of these two risk factors was significantly higher in individuals with migration background from Russia and tended to be higher in individuals with

migration background from Europe. In line with that, individuals with migration background from Russia and Europe had a significantly higher body mass index. In contrast, individuals with migration background from other countries exhibited trends towards lower body mass index and lower prevalence of obesity when compared to individuals without migration background (Table 1). Further, there was a trend towards lower high-density lipoprotein and higher glycosylated haemoglobin in individuals with migration background, which reached statistical significance in individuals with migration background from Russia (Table 1).

Exploratory analyses revealed that an income below the median was more frequent in individuals with migration background (OR 2.3; 95% CI 1.7–3.0) and was significantly associated with higher BMI and obesity, metabolic syndrome, lower HDL, higher HbA1c, and higher eGFR. However, additional adjustment for the income status did not alter the results presented in the table substantially (data not shown). Further, differential effects between women and men were seen in BMI and HbA1c. Female individuals with migration background had an increased BMI by 2.3 kg/m² (95% CI 1.4–3.1, $p < 0.001$) while the difference in men was only 0.4 kg/m² (95% CI -0.4 – $+1.3$, $p = 0.31$); interaction p -value 0.003. HbA1c was increased only in female individuals with migration background ($+0.2\%$, 95% CI $+0.1$ – 0.3 , $p < 0.001$); no difference in men, $p = 0.71$; p for interaction 0.006. Regarding HDL, there was no significant difference between males and females.

4. Discussion

In this age- and sex-stratified sample representative of Würzburg inhabitants, we observed different cardiovascular risk factor patterns in individuals with and without migration background.

While prevalence of hypertension, atherosclerotic disease, diabetes mellitus, smoking status, and alcohol consumption were similar between groups, prevalence of obesity and metabolic syndrome were significantly higher in individuals with migration background. Detailed analyses revealed that the risk factor profile depended on the country/region of origin, with the least favourable profile in individuals with migration background from Russia.

An extensive body of research related to individuals with migration background in a variety of countries has postulated a "healthy migrant effect". Positive self-selection of the health status in migrants and the selection exerted by the host countries renders immigrants healthier when arriving in the host country than comparable individuals without migration background [4,13]. With prolonged residence in the host country, the health status of individuals with migration background might adapt to that of individuals without migration background or even become worse, depending on acculturation [14], the differential access to and use of health services, differences in protective health-related behaviour and the cultural, religious, and linguistic background [3–6]. For example, data from Denmark showed an effect of duration of residence on disease occurrence among migrants [15], with increasing incidence of diabetes mellitus, coronary disease, and stroke with longer duration of residence in Denmark. Recent data from Germany further highlight the importance of acculturation regarding health related quality of life in individuals with migration background suggesting interventions targeting separated and marginalized individuals [14].

Adequate control of risk factors is likely to prevent the evolution of cardiac dysfunction and heart failure [16,17], suggesting early identification of risk factors and subsequent life style modification or pharmacotherapy. The community-based Malmö Diet and Cancer cohort study revealed an increased risk of hospitalization for heart failure in immigrants compared to the native Swedish population, and attributed it to a higher waist circumference [5]. Recent publications from Austria suggested that the risk to acquire tooth decay, increased body weight and reduced motor performance depended on migration status [3,18]. Further, significant differences in addictive behaviour and cessation patterns regarding smoking were reported in adults with and without a

Table 1
Profile of risk factors in participants with and without migration background.

Risk factor	No migration background N = 2168	Migration background N = 291	Difference ^a (95% CI)	EU N = 107	RU N = 117	OC N = 67
Hypertension, n (%)	995 (46)	121 (42)	1.2 (0.9–1.5)			
Atherosclerotic disease, n (%)	149 (7)	19 (7)	1.3 (0.8–2.2)			
Diabetes mellitus, n (%)	214 (10)	24 (8)	1.1 (0.7–1.7)			
Obesity, n (%)	413 (19)	70 (24)	1.5 (1.1–2.1)	1.6	2.2*	0.6
Metabolic syndrome, n (%)	401 (18)	61 (21)	1.5 (1.1–2.0)	1.2	1.7*	1.5
Ever smoked, n (%)	1173 (54)	152 (53)	1.1 (0.8–1.4)			
Current smoker, n (%)	398 (18)	63 (22)	1.1 (0.8–1.5)			
Alcohol consumption >14 dpw, n (%)	180 (8)	17 (6)	0.8 (0.5–1.3)			
Systolic BP [mm Hg], mean (SD)	131 (18)	128 (18)	−1.5 (−3.5... + 0.5)			
Diastolic BP [mm Hg], mean (SD)	79 (10)	78 (10)	−0.3 (−1.5...+0.9)			
Body mass index [kg/m ²], mean (SD)	26.4 (5.0)	27.4 (5.5)	+1.4 (+0.8...+2.0)	+1.5*	+2.2*	−0.2
Waist/hip ratio [%], mean (SD)	91 (12)	91 (10)	+1 (−1...+2)			
Total cholesterol [mg/dL], mean (SD)	208 (38)	206 (42)	−0.3 (−5.0...+4.4)			
HDL cholesterol [mg/dL], mean (SD)	64 (19)	61 (18)	−3 (−5...−1)	−1	−4*	−3
LDL cholesterol [mg/dL], mean (SD)	123 (34)	123 (38)	+2 (−3...+6)			
Triglycerides [mg/dL], mean (SD)	112 (82)	112 (73)	+2 (−8...+12)			
HbA1c [%], mean (SD)	5.5 (0.6)	5.6 (0.6)	+0.1 (+0.0...+0.2)	−0.0	+0.1*	+0.1
eGFR [mL/min/1.73 m ²], mean (SD)	86 (15)	91 (15)	+3 (+1...+4)	+3*	+2	+3*

Data are count (percent), or mean (SD).

Dpw, drinks per week; BP, blood pressure; HDL, high-density lipoprotein; LDL, low-density lipoprotein; eGFR, estimated glomerular filtration rate according to the CKD-Epi formula [20].

^a Differences between individuals with migration background and individuals without migration background are reported with adjustment for age and sex as odds ratio (OR; for frequencies) or mean difference (Δ or geometric mean ratio [GMR] for continuous variables), each with 95% confidence interval (CI). If significant at the 5% level ("1" is not in the 95% CI for OR or GMR; "0" is not in the 95% CI for Δ), mean effects are displayed separately in subgroups originating from a country of the European Union (EU), Russia (RU), or other countries including unspecified (OC). Asterisk (*) denotes significance at the 5% level in the comparison with individuals without migration background.

migration background [19]. Nevertheless, knowledge on the prevalence of cardiovascular risk factors in individuals with migration background is scarce and there are no data on this topic from Germany.

In this population-based cohort, we did not find any statistical significant differences in the prevalence of smoking or the amount of alcohol consumption between individuals with and without migration background. In addition, the prevalence of hypertension, atherosclerotic disease, and diabetes mellitus was equal. Nevertheless, individuals with migration background had a higher prevalence of metabolic syndrome and obesity and showed a less favourable metabolic profile as indicated by a higher body mass index, lower high-density lipoprotein, and higher values of glycosylated haemoglobin. Individuals with migration background from Russia exhibited the least favourable risk profile.

5. Limitations

Due to the lack of information on the parents' native citizenship, we were not able to apply the definition for an "individual with migration background" used in the official German health survey. Nevertheless, we think that our definition based on native language and country of birth rather than the parents' descent comprehensively captures the cultural background of an individual, which, in regards of our research question, might have the strongest impact on the prevalence of modifiable risk factors. Further, the response rate of individuals with migration background might differ from the total response rate and cause an underrepresentation of these individuals in our study sample. Especially individuals with no or few knowledge of the German language, whose accessibility for prevention programs might be the most challenging [14], might not have participated in a representative number. However, based on the study protocol we only were allowed to send a written invitation in German and to wait for a positive response of potential participants. Further actions like translation of the invitation letter in several foreign languages or invitation via telephone by a translating person might have enhanced positive response rates in these individuals and might be considered for future studies.

Gender differences in risk factor profiles requiring tailored prevention strategies might be an important topic. In exploratory analyses, we found a strong relation between female sex and increased body mass index and higher HbA1c values. Nevertheless, due to the number of individuals with migration background, our sample is underpowered

to perform reliable subgroup analyses and our exploratory results need further validation in larger samples.

6. Conclusion

Our cross-sectional data might indicate an increased risk to develop cardiovascular diseases and heart failure in individuals with migration background, especially in individuals from Russia. These data underline the need for more detailed investigations regarding the causes of higher risk factor prevalence and the evaluation of potential specific targets for risk prevention in individuals with migration background.

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Disclosures

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