

Prevalence of cardiovascular disease risk factors, health behaviours and atrial fibrillation in a Nepalese post-seismic population: a cross-sectional screening during a humanitarian medical mission

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Abstract

Background and Aims: Nepal is a developing country with increasing rates of cardiovascular disease (CVD), and the recent 2015 earthquakes imposed critical social and epidemiological effects to the population. This study aims to assess the prevalence of CVD risk factors, social health behaviours and atrial fibrillation (AF) in a native population from a remote Nepalese village that was the epicentre of the May 2015 earthquake.

Methods: Observational, cross-sectional study, addressing the population of dislodged inhabitants of Sindhupalchok. Data was collected during an opportunistic clinical screening in the midst of a humanitarian medical mission and consisted of demographic, anthropometric and medical data.

Results: A total of 270 patients were assessed (41% in a temporary settlement with continuous organisational support and 59% in the remote village with less back-up). Among adults, 89% had low fruit consumption, 49% were overweight or had augmented waist circumference, 42% had smoking habits, 57% consumed alcohol regularly, 22% had high blood pressure measurements and 5% had abnormal glycaemic levels. An 11% prevalence of AF was found among the elderly

Conclusions: The studied population has a high prevalence of CVD risk factors, poor health behaviours and a significant prevalence of AF among the elderly representatives. International partnering and humanitarian work might be important tools to assess the population's needs and implement corrective measures.

Keywords: Atrial fibrillation; cardiovascular disease risk factors; cardiovascular disease prevention; developing countries; health behaviours; public health.

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Introduction

Non-communicable disease are increasing worldwide and are responsible for the leading causes of death in developed and developing countries.¹ In this scenario, the developing countries are changing their epidemiology regarding the major cause of death, from infectious to cardiovascular disease (CVD), which, according to the World Health Organization (WHO), are

responsible for about 31% of global deaths.²

Various risk factors contributing to this rise up in CVD in developing countries have been cited: rising life expectancy, globalisation, rural exodus and the trend to urbanisation are being pointed.³⁻⁸ As a consequence, lifestyle changes (in regard to smoking, alcohol consumption, diet and physical inactivity) associated to a susceptible population with low socioeconomic

status lead to increasing CVD risk factors prevalence. In order to change this trend, field experts recommend a stepwise robust approach: (i) evaluate the way people live, (ii) assess the main CVD risk factors and (iii) sensitize the population and health care providers for this problem in order to promote changes towards a healthy lifestyle.⁹⁻¹⁴

Nepal is an example of this paradigm - from 2005 to 2015, the ischemic heart disease increased around 25.3% and cerebrovascular disease increased 25.7%.¹⁵ About 40% of non-communicable admissions are due to CVD,¹⁶ and these facts create an enormous social burden reducing labour productivity and creating an overcharge of public fees, in a country with a poor healthcare system and a feeble economy.¹⁷ Although the status of CVD risk factors in Nepal has been previously assessed¹⁸⁻²¹, the April and May 2015 earthquakes imposed critical social and epidemiological pressures, resulting in critical lifestyle changes.²²

The aim of this study was to appraise the prevalence of CVD risk factors and health behaviours in a native Nepalese population from a remote village that was the epicentre of the May 2015 earthquake, opportunistically assessed during a humanitarian mission 18 months after the event.

Methods

Data collection

An observational, cross-sectional study was carried out during a humanitarian mission in Nepal, aimed to provide medical care to the people of Sindhupalchok, a northern Nepalese region, comprised of 14 small villages and epicentre of the May 2015 earthquake. Due to heavy seismic damage, most of the approximately 1200 inhabitants got dislodged from their homes. Particularly in this region, there were victims that stayed in nearby the village area and those who went towards Kathmandu looking for support in temporary settlements that provided shelter, food, sanitation and community activities. Both these populations were supported by the medical mission.

The recruitment of participants was performed through two methods: subjects who were randomly invited to do a general medical check-up and those who appeared with acute complaints - in addition to provide clinical support to the complains of these patients, a general medical evaluation was made simultaneously. During these contacts, verbal consent was provided by the participants. Young adults were defined as being between 18 and 64 years-old and elderly as being 65 years-old or older.

Cross-sectional data was collected during two months, approximately 18 months after the earthquake. This data was collected through the use of the available portable medical equipment (stethoscope, sphygmomanometer, measuring tape and electrocardiograph) and included demographic data (age, gender, origin, education, occupation), anthropometric data (height, weight, waist circumference, body mass index), previous medical history, CVD risk factors and health behaviours (see below) and electrocardiogram (ECG) in case of symptomatic arrhythmia or identification of an irregular pulse. The assessment of CVD risk factors and health behaviours was based in a question-by-question guide provided by the WHO:^{21, 23, 24}

- (a) Low fruit consumption: less of one serving of fruit per day;
- (b) Smoking habits: "smoker" if current daily smoker; "ex-smoker" if past smoking habits;

- (c) Alcohol consumers: respondents who consumed alcohol in the previous 30 days; "moderate to severe consumption" if >40g/daily of pure alcohol for men or >20g/daily of pure alcohol for women;
- (d) Physical activity: it included questions on number of days and time spent on physical activities at work, travel to and from places and recreational activities; responses were then converted to metabolic equivalent of task (MET);
- (e) Overweight: body mass index (BMI) ≥ 25 kg/m²;
- (f) Augmented waist: ≥ 80 cm for female or ≥ 90 cm for male;
- (g) High blood pressure (BP): included those who self-reported as having hypertension, currently on medication for raised BP and those who had high blood pressure (systolic BP ≥ 140 and/or diastolic BP ≥ 90 mmHg) during the time of survey;
- (h) Blood glucose: assessed if ≥ 35 years-old or other CVDs risk factor present; "diabetes mellitus (DM)" if self-reported as having DM, currently on medication for high glycaemia or fasting plasma venous value ≥ 126 mg/dl; "impaired fasting glycaemia (IFG)" if fasting plasma venous value ≥ 110 mg/dl to < 126 mg/dl.

Statistical Analysis

Characteristics of the populations of the camp and the village with a normal distribution were presented as means with standard deviations or as absolute numbers with percentages of the total. Non-normally distributed variables were presented as medians. Analyses were carried out using SPSS 23.0 software and p values ≤ 0.05 were considered statistically significant.

Results

A total of 270 patients were assessed during the medical mission, representing 23% of the village's total population, with 41% (N=111) of the subjects being settled in the camp (see table 1). The total adult population was 164 individuals, counting for 61% of the total sample. It is noteworthy that the camp consists of a much younger sample (mean age 21 vs 37 years-old, $p < 0.001$), without individuals older than 65 years old. In the adult population, different literacy (16.9% vs 26.7%) and occupation levels (71.3% vs 78.2%) were identified between the groups, although not statistically significant.

In regard of CVD risk factors and health behaviours of the overall adult population, 89% had low fruit consumption, 49% were overweight or had augmented waist circumference, 42% had smoking habits, 57% consumed alcohol regularly, 22% had high BP measurements and 5% had abnormal glycaemic levels.

When comparing the two groups, and in what matters to daily health habits, adults from the village were more likely to eat fruit (13.8% vs 5.5%) and to be more physically active (2.9 vs 2.4 MET). On the other hand, smoking and alcohol consuming habits were more pronounced in the village (50.5% vs 25.9% and 68.8% vs 33.2%, respectively). Adults from the camp tended to have less high BP measurements (15.1% vs 25.9%) and there was a minor expression of overweight, especially in the female population (60.6% vs 71.2%).

Regarding the arrhythmic burden, an 11% prevalence of atrial fibrillation (AF) was found among the village's elderly population.

Table 1: The comparison of QTd in the case and control groups

	Total	Camp	Village
Number	270	111	159
Age (SD)	31 years	21 years (\pm 14)	37 years (\pm 25)
paediatric population	106	56	50
adult population	137	55	82
elderly	27	0	27
ADULT AND ELDERLY POPULATION (N = 164)			
Female (N)	62.2% (102)	61.8% (34)	62.4% (68)
Level of illiteracy (N)	76.5% (124)	83.1% (45)	73.3% (79)
Unemployment rate (N)	26.4% (43)	28.7% (31)	21.8% (12)
Cardiovascular Risk Factors			
Low fruit consumption (N)	89.0 (146)	94.5 (52)	86.2 (94)
Physical activity	2.7 MET	2.4 MET	2.9 MET
Body Mass Index \geq 25 (N)	25.0%	23.1%	26.0%
Waist circumference (N)			
\geq 80cm in females	54.0% (34)	65.5% (19)	44.1% (15)
\geq 90cm in males	18.6% (11)	25.0% (5)	15.4% (6)
BMI \geq 25 or augmented waist (N)			
Females	67.7% (67)	60.6% (20)	71.2% (47)
Males	23.0% (14)	23.8% (5)	22.5% (9)
Smoking habits (N)			
smoker	31.9% (52)	25.9% (14)	34.9% (38)
ex-smoker	10.4% (17)	0% (0)	15.6% (17)
Alcohol consumption (N)			
mild	38.0% (62)	24.2% (15)	43.1% (47)
moderate to severe	19.0% (31)	9.0% (3)	25.7% (28)
High BP measurement (%)			
Mean systolic BP	121 mmHg	121 mmHg	121 mmHg
Mean diastolic BP	80 mmHg	79 mmHg	80 mmHg
DM or IFG in \geq 35yo (%)	5.5% (6)	10.0% (2)	4.5% (4)
Atrial Fibrillation in elderly (N)	11.1% (3)	0% (0)	11.1% (3)

Discussion

When analysing the overall prevalence of CVD risk factors of the studied adult population, their high prevalence is concerning. A National survey in 2013 confirmed this trend in regard of high BP levels (25.7%) and insufficient fruit consumption (98.9%)²¹, but it is worth highlighting the alarming levels of smoking (42.3% vs 18.5%) and alcohol consumption (57.0% vs 17.4%) found in this particular population in comparison to the survey. Other studies carried out in rural Nepal^{18-20,25} and slums of urban areas²⁶ also corroborate with this trend, and it is believed that the earthquake experience in the early years of life has long-term effects on adult CVD expression.²⁷ To our knowledge, this is the first study that assesses the prevalence of CVD risk factors in a post-seismic rural setting.

Regarding the observed differences between the population that stayed in the village and the one lodged in the camp, the latter is a much younger representation and various factors play a major influence: (i) many older villagers did not adapt to the urban context and preferred to return to their rural home, where they have always lived; (ii) the majority of the kids and the respective young parents had to stay in the camp for academic purposes, since many infrastructures and public services of the village, namely schools, were damaged; and (iii) the more experienced, active adult population had to return to the village in order to rebuild their houses. The illiteracy levels were remarkably high, and might have hindered the correct assessment of clinical information – an observation opposite from the paediatric population, showing the effectiveness of recent educational

efforts from the Nepalese Government.²⁸

When comparing these two distinct settings of this particular Nepalese population that suffered from the 2015 earthquake (the separating event), some interesting observations could be done:

- Regarding daily health habits, the specific social and cultural contexts might explain some of the differences observed. Although not statistically significant, there was a trend towards more fruit consumption and physical activity in the village - the bucolic, rural context and the predominance of agrarian activities for livelihood in the village, in contrast to a provisional camp settled in an urban setting, might explain these results;
- Alcohol consumption was also more intense in the village - the restricted access to the home-made beverage, the need of using a shared kitchen aimed to prepare the community meals and the supporting Non-Governmental Organization (NGO) efforts in diminish its consumption in the camp, are possible explanations of this difference;
- Tobacco habits followed this same trend, with less smoking in the camp - the supporting NGO's education efforts and the constant presence of the children in a confined space might justify some of this difference, however a representation bias cannot be excluded;
- Although not statistically significant, there were less people with high BP measures in the camp - the different nutritional habits (with meals prepared in a shared community kitchen and ingredients supplied by the supporting NGO), along with the frequent contact with volunteer physicians, might have played a role in this context.

Nonetheless, the authors emphasize that these groups are very different, with multiple bias that hinder potential direct comparisons with the observed data.

This study also hints for the role of humanitarian clinical work and international partnering as means to obtain valuable epidemiological information and to implement preventive and health promoting attitudes for populations at risk. With the advent of a more solid structure and better support, it is possible to enhance the level of assistance and act in other opportune dimensions, namely CVD risk factors. As a future challenge, it would be interesting to assess the effectiveness of implementing a simple program towards CVD prevention, synergistically with the supporting NGO and local institutions main activities – with the ultimate goal of autonomously capacitate the population that is being supported and related shareholders.

Finally, a high prevalence of frequently asymptomatic AF in the observed elderly population was found: 11%. A recent study in Nepal's national referral centre of Cardiology and Cardiac Surgery, showed a 13.8% prevalence of AF in patients attending the emergency department of that tertiary care cardiac centre²⁹, highlighting the influence of the endemic rate of rheumatic heart disease. This observation highlight the importance of creating awareness for this problem in Nepal, and grounds the need of approaching it in terms of diagnosis, appropriate treatment and follow-up.

This evaluation has the intrinsic limitations of being an observational, cross-sectional study, with a small amount of participants and representing a very specific Nepalese population. A longer clinical project, and equipped with more robust logistics, would allow to broaden the population coverage, augmenting the number of individuals included in the study, solidifying results and enabling more robust data towards future interventions.

Conclusion

A population of Nepalese people that suffered from the May 2015 earthquake have a high prevalence of CVD risk factors and poor health behaviours. Additionally, there is a significant prevalence of AF in the elderly representatives of this population. International partnering and humanitarian work might be important tools to assess the population's needs and implement corrective measures.

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Declaration of conflicting interests

All authors have no conflict of interest, nor received any funding.

Ethics

The authors have no ethical approval, funding or competing interests to declare. Ethical approval was not required for this study, since it did not involve access to or collection of private or sensitive data, it was completely anonymous and the participants were not defined as “vulnerable” nor did participation induced undue psychological stress or anxiety. During the medical interview, verbal consent was provided by all the participants.

References

- Mendis S. WHO Global status report on noncommunicable diseases 2014. World Health Organization, 2014.
- WHO. Cardiovascular diseases (CVDs) media centre. 2016.
- Rasiah R, Yusoff K, Mohammadreza A, et al. Cardiovascular disease risk factors and socioeconomic variables in a nation undergoing epidemiologic transition. *BMC Public Health*. 2013; 13: 886. <https://doi.org/10.1186/1471-2458-13-886>
- Vaidya A. Tackling cardiovascular health and disease in Nepal: epidemiology, strategies and implementation. *Heart Asia*. 2011; 3: 87-91.
- Vaidya A, Shakya S and Krettek A. Obesity prevalence in Nepal: public health challenges in a low-income nation during an alarming worldwide trend. *Int J Environ Res Public Health*. 2010; 7: 2726-44. <https://doi.org/10.3390/ijerph7062726>
- Anand K, Shah B, Yadav K, et al. Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad. *Natl Med J India*. 2007; 20: 115-20.
- Engelgau MM. Capitalizing on the Demographic Transition: Tackling Noncommunicable Diseases in South Asia. 2011.
- Atlas Writing G, Timmis A, Townsend N, et al. European Society of Cardiology: Cardiovascular Disease Statistics 2017. *Eur Heart J*. 2018; 39: 508-79. <https://doi.org/10.1093/eurheartj/ehx628>
- Mendis S. Cardiovascular risk assessment and management in developing countries. *Vasc Health Risk Manag*. 2005; 1: 15-8. <https://doi.org/10.2147/vhrm.1.1>. <https://doi.org/10.2147/vhrm.1.1>
- Modesti PA, Agostoni P, Agyemang C, et al. Cardiovascular risk assessment in low-resource settings: a consensus document of the European Society of Hypertension Working Group on Hypertension and Cardiovascular Risk in Low Resource Settings. *J Hypertens*. 2014; 32: 951-60. <https://doi.org/10.1097/HJH.0000000000000125>
- IOM. Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health. Washington, DC: The National Academies Press. 2010.
- WHO. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. 2013.
- WHO. Cardiovascular disease Strategic priorities. 2017.
- Uthman OA, Hartley L, Rees K, et al. Multiple risk factor interventions for primary prevention of cardiovascular disease in low- and middle-income countries (Review). *Cochrane Database of Systematic Reviews*. 2015; 2015: 78.
- Institute for Health Metrics and Evaluation. Nepal, 2015. www.healthdata.org.
- Bhandari GP, Angdembe MR, Dhimal M, Neupane S and Bhusal C. State of non-communicable diseases in Nepal. *BMC Public Health*. 2014; 14: 23. <https://doi.org/10.1186/1471-2458-14-23>
- Abegunde DO, Mathers CD, Adam T, Ortegón M and Strong K. The burden and costs of chronic diseases in low-income and middle-income countries. *Lancet*. 2007; 370: 1929-38. [https://doi.org/10.1016/S0140-6736\(07\)61696-1](https://doi.org/10.1016/S0140-6736(07)61696-1)
- Vaidya A, Aryal UR and Krettek A. Cardiovascular health knowledge, attitude and practice/behaviour in an urbanising community of Nepal: a population-based cross-sectional study from Jhaukhel-Duwakot Health Demographic Surveillance Site. *BMJ Open*. 2013; 3: e002976. <https://doi.org/10.1136/bmjopen-2013-002976>
- Dhungana RR, Devkota S, Khanal MK, et al. Prevalence of cardiovascular health risk behaviors in a remote rural community of Sindhuli district, Nepal. *BMC Cardiovasc Disord*. 2014; 14: 92. <https://doi.org/10.1186/1471-2261-14-92>

20. Kalra S, Narain S, Karki P, Ansari JA, Ranabhat K and Basnet N. Prevalence of risk factors for coronary artery disease in the community in eastern Nepal--a pilot study. *J Assoc Physicians India*. 2011; 59: 300-1.
21. WHO. Non Communicable Diseases Risk Factors: STEPS Survey Nepal 2013. 2013.
22. NP NRAGoN. Nepal Earthquake 2015 Post-Disaster Recovery Framework. 2016.
23. WHO. The WHO STEPwise approach to chronic disease risk factor surveillance (STEPS). 2008.
24. WHO. Waist Circumference and Waist-Hip Ratio (Report of a WHO Expert Consultation). 2008.
25. Stewart CP, Christian P, Wu LS, LeClerq SC, Khatry SK and West KP, Jr. Prevalence and risk factors of elevated blood pressure, overweight, and dyslipidemia in adolescent and young adults in rural Nepal. *Metab Syndr Relat Disord*. 2013; 11: 319-28. <https://doi.org/10.1089/met.2013.0016>
26. Oli N, Vaidya A and Thapa G. Behavioural Risk Factors of Noncommunicable Diseases among Nepalese Urban Poor: A Descriptive Study from a Slum Area of Kathmandu. *Epidemiology Research International*. 2013; 2013: 13. <https://doi.org/10.1155/2013/329156>
27. Li N, Wang Y, Zhao X, et al. Long-term effect of early-life stress from earthquake exposure on working memory in adulthood. *Neuropsychiatr Dis Treat*. 2015; 11: 2959-65.
28. WB HDUSAR. Nepal: Priorities and Strategies for Education Reform (Document of the World Bank). 2001.
29. Adhikari KP, Malla R, Limbu D, et al. Prevalence of Atrial Fibrillation in patients attending emergency department of Shahid Gangalal National Heart Centre, Kathmandu, Nepal. *Nepalese Heart Journal*. 2016; 13: 4. <https://doi.org/10.3126/njh.v13i1.14536>