Cardiovascular risk assessment in Community Pharmacies in Warri, Nigeria

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Abstract
Many apparently healthy persons have multiple risk factors for cardiovascular disease without being aware. Assessing cardiovascular risks and initiating appropriate interventions and referrals at the community pharmacy level could be lifesaving. The objective of this study was to explore cardiovascular risk assessment on community pharmacy clientele and to determine the proportion of patients with high cardiovascular risk factors. Subjects (140) were recruited from 5 community pharmacies in Warri Metropolis. Cardiovascular risks assessment was done among subjects that met the inclusion criteria. Blood pressure, total cholesterol levels, Diabetes status, age and gender were documented in a data collection form. Risk stratification was done using World Health Organization/ International Society of Hypertension WHO/ISH risk assessment chart. Data were analyzed using SPSS version 20. Subjects (116) who met the inclusion criteria were screened. About half (50.9%) were moderate users of alcohol. Majority (81.9%) of patients were physically active. Few subjects (2.6%) were tobacco users. Total cholesterol values and fasting blood sugar levels were abnormal for 12.9% and 4.3% of subjects respectively. The proportion of subjects with high cardiovascular risk was 6%. Cardiovascular risk assessment is feasible in community pharmacy setting. Only 6% of subjects were at high cardiovascular risk.

Keywords: Cardiovascular risk assessment, Community pharmacy, WHO/ISH charts

INTRODUCTION
Cardiovascular disease (CVD) are a leading cause of morbidity and mortality and is responsible for one-in-three deaths globally [1,12]. The modifiable risk factors for cardiovascular disease include hypertension, diabetes, smoking, high blood lipids or physical inactivity [2]. CVD events, mainly heart attacks and strokes, are preventable if prompt action is taken to reduce risk factors. Global risk assessment is the preferred option if risk factor reduction is to have a significant impact [3]. Global risk assessment takes into consideration all possible factors that could potentially influence development of cardiovascular disease to calculate a risk score that is more useful than addressing individual elevated risk factors [3]. Various tools can be used to facilitate global risk assessment and target interventions towards patients who will get the most benefit from them [4,6-9]. The American Heart Association recommends that adults 40 to 79 years of age should have their cardiovascular risk assessed every four to six...
years [5]. The World Health Organization/International Society of Hypertension (WHO/ISH) risk assessment tool consists of 28 different charts specific for each of the 14 WHO epidemiological sub-regions [10,11]. This tool is well suited for use in resource limited environments because of its simplicity. The input variables are age, gender, systolic blood pressure, and diabetes and tobacco use status and total cholesterol level. Colour codes are used to determine the 10-year risk of combined myocardial infarction and stroke (fatal and non-fatal) [10]. Use of the WHO/ISH risk assessment tool involves selecting the appropriate chart depending on the study region, gender, age, diabetes and smoking status of the patient. The color region that corresponds to the point of intersection of the systolic blood pressure and total cholesterol level defines the risk category of the patient. Color codes range from green (very low < 10%); Yellow (low 10% - <20%), Orange (moderate 20% - <30%); Red (high 30% - <40%), deep red (Very high ≥ 40%).

Even though the charts may underestimate CVD risk in certain persons, they provide reliable guide to cardiovascular risk [11]. The main objective of this study was to explore cardiovascular risks among community pharmacy clientele using the WHO/ISH risk chart. Specific objectives were to determine the number of patients with systolic and diastolic blood pressures above 140/90mmHg, determine proportion of patients with cholesterol level above 5 mmol/l, determine the number of patients with high fasting and random blood sugar levels to determine proportion of patients in the high-risk categories and to explore association between clinical characteristics and risk category.

METHOD

Setting. Risk assessment was carried out in selected community pharmacies located in Warri, Nigeria. Warri is a cosmopolitan city with an estimated population of 700,000 people. The city’s economic activities revolve around oil exploration. A government general hospital and many private hospitals, clinics and traditional healing homes undertake health delivery in the city. About eighty registered pharmaceutical premises and more than 500 medicine vendors who operate in the area. Five pharmacy premises were purposively selected for this study based on customer turnover and willingness of resident pharmacists to facilitate the study.

Patients/ population inclusion and exclusion criteria. All patients visiting the pharmacy who met the inclusion criteria were evaluated. Patients must be between age 40 and 80 years. Patients below 40 years with very high blood pressure or cholesterol levels and those who were willing to participate in the study by signing a consent form. Patients who did not meet the inclusion criteria were excluded from the study.

Outcome measures. The primary outcome measure was the proportion of clients with high cardiovascular risk. Secondary outcome measures were: proportion of clients who use tobacco, proportion of clients who were physically active (30 minutes of moderate activity at least 3 times a week), and proportion of clients who were moderate to high consumers of alcohol. Proportion of clients with high systolic and diastolic blood pressure levels, proportion of clients with high blood glucose levels and proportion of clients with total cholesterol levels above 5 mmoles/liter.

Data collection procedures. Patient’s specific data were collected on the first visit and entered into a data collection form. Consenting patients were evaluated after signing an informed consent form. Data collected include patient demographic and clinical characteristics such as blood pressure, blood cholesterol level, blood glucose level. Blood pressure was measured using an automated BP apparatus (Omron 1A1B). The
subject was asked to be seated with arm supported so that the cuff was at heart level. After resting for about 5 minutes, the cuff was inflated to desired level. The subject was asked not to talk during measurement. Two measurements were taken and average recorded. Total cholesterol was measured using Multi-care cholesterol meter (Biomedical Systems International, Italy). A finger-prick sample was obtained with an automatic lancing device following strict aseptic procedure. An Acuchek Active (R) glucose meter was used for obtaining blood glucose measurement. The procedure is similar to that followed in obtaining cholesterol measurement.

**Data analysis.** Data analysis was done using IBM SPSS Version 20 statistical package. [12]. Socio demographic and clinical characteristics were expressed as frequencies and percentages. Chi Square test was used to explore association between clinical characteristics and risk category based on gender and age. Logistic regression analysis was done to identify predictors of risk category. A P value of less than 0.05 is considered significant.

**Ethical approval.** Ethical approval for the study was obtained from the Health Research Ethics Committee, Delta State University Teaching Hospital, Oghara, and Delta State, Nigeria. Ethical approval No.: DELSUTH/HREC/2015/038

**RESULTS**

Subjects (140) from five community pharmacies were recruited for the study. Of these, 24 were excluded since they did not meet the inclusion criteria. There were more males, 65 (56%) than females, 51 (44%). Nearly half of the subjects, 52 (44.8%) were in the 40-50 age group, only few, 3 (2.7%) were smokers. Majority of subjects 95 (81.9%) claimed to be physically active. There were more subjects with abnormal cholesterol levels 15 (12.9%) than glucose 5 (4.3%), (tables 1 and 2). Majority were in the low-risk category. Only 7 (6%) of subjects were in the high/very high category, Figure 1. Age stratification showed a significant association between age and systolic and diastolic blood pressures, \(X^2 = 7.488, 3, P = 0.058; X^2 = 14.750, df 3, P = 0.000\) respectively. There was no significant association between age and other clinical characteristics Table 3.

A Chi Squared test was done to evaluate association between clinical characteristics and risk category based on gender and age. Systolic blood pressure and cholesterol level were significantly associated with high-risk category in males, \(X^2 = 21.202, P = 0.031; X^2 = 18.493, 5df, P = 0.002\) respectively. For the females, only systolic and diastolic blood pressures were significantly associated with high-risk category, \(X^2 = 48.06, df 16, P = 0.001; X^2 = 25.06, df = 10, P = 0.005\).

Age, gender, smoking status, systolic blood pressure, diastolic blood pressure, total cholesterol, and random blood sugar were used in a logistic regression analysis to predict risk category. The prediction model was statistically significant. \(F = 8.138, df 9, P < 0.001\) and accounted for 49.7%. \(R^2 = 0.497\). Adjusted \(R^2 = 0.436\). The raw and standardized coefficients of the prediction model and correlation with involvement are shown in table 4. Systolic blood pressure, total cholesterol level, and random blood sugar were the highest predictors of cardiovascular disease in this population.

**DISCUSSION**

The purpose of this study was to explore at risk patients and assess the feasibility of carrying out cardiovascular risk assessment in the community pharmacy setting. The fact that more males than females showed willingness to participate in this study is not surprising since men are generally at greater risk of heart disease than pre-menopausal women. However, risk levels in post- menopausal women are similar to that of
men [13,14]. The proportion of smokers in this study was quite small which may be a reflection of increased public awareness of the dangers associated with smoking and the benefits of quitting [15-16]. Smoking is estimated to cause nearly 10% of all cardiovascular diseases [17].

### Table 1: Socio-Demographics of Subjects

| Variable          | N (%) |
|-------------------|-------|
| **Sex**           |       |
| Male              | 65(56.0) |
| Female            | 51(44.0) |
| **Age**           |       |
| <40               | 2(1.7)  |
| 40-50             | 52(44.8) |
| 51-60             | 33(28.4) |
| 61-70             | 21(18.1) |
| >70               | 8(6.9)   |
| **Tobacco use**   |       |
| Yes               | 3(2.6)  |
| No                | 113(97.4) |
| **Smoking habit** |       |
| Occasional        | 1(0.0)  |
| Moderate          | 1(0.9)  |
| Heavy             | 1(0.9)  |
| Non-smokers       | 113(98.2) |
| **Alcohol use**   |       |
| Moderate          | 59(50.9) |
| Heavy             | 1(0.9)  |
| Don’t Drink       | 56(48.3) |
| **Physical activity/week** |       |
| 0 time            | 2(1.7)  |
| Once              | 3(2.6)  |
| Twice             | 16(13.8) |
| Thrice            | 64(55.2) |
| Everyday          | 31(26.7) |
| **Activity category** |     |
| Physically active | 95(81.9) |
| Physically inactive | 21(18.1) |
| **Chronic illness** |     |
| Diabetes mellitus | 13(11.2) |
| Hypertension      | 26(22.4) |
| Angina            | 3(2.6)  |
| Diabetes / Hypertension | 4(3.4) |
| None              | 70(60.3) |

### Table 2: Clinical Characteristics of subjects

| Variable                        | N(%) n=116 |
|---------------------------------|------------|
| **Blood pressure (systolic)**   |            |
| Normal (90-119)                 | 11(9.5)    |
| Pre hypertension (120-139)      | 68(58.6)   |
| Stage One (140-159)             | 31(26.7)   |
| Stage Two (≥160)                | 6(5.2)     |
| **Blood pressure (diastolic)**  |            |
| Normal (60-79)                  | 37(31.9)   |
| Pre hypertension (80-89)        | 48(41.4)   |
| Stage One (90-99)               | 15(12.9)   |
| Stage Two (≥100)                | 16(13.8)   |
| ISH                             | 13(11.2)*  |
| **Blood glucose (fasting)**     |            |
| <7mm/L                          | 12(10.3)   |
| ≥7mm/L                          | 5(4.3)     |
| **Blood glucose (random)**      |            |
| <11mm/L                         | 87(75.0)   |
| ≥11mm/L                         | 12(10.5)   |
| **Total cholesterol**           |            |
| ≥5mmol/L                        | 15(12.9)   |
| <5mmol/L                        | 101(87.1)  |

*Already captured as part of high systolic blood pressure, does not contribute to totals
### Table 3: Clinical Characteristics stratified by age

| Age group (yr.) | SBP ≥140mmHg | DBP ≥90mmHg | FBS ≥7mm/L | RBS ≥11mm/L | CHOL ≥5mm/L | HRS ≥20 |
|-----------------|---------------|-------------|------------|-------------|-------------|--------|
| 40-50           | 16(39.0)      | 16(50.0)    | 1(20.0)    | 3(25.0)     | 7(46.7)     | 2(33.3) |
| 51-60           | 12(29.3)      | 10(31.3)    | 3(60.0)    | 6(50.0)     | 2(13.3)     | 2(33.3) |
| 61-70           | 9(22.0)       | 3(9.4)      | 1(20.0)    | 3(25.0)     | 4(26.7)     | 1(16.7) |
| >70             | 4(9.8)        | 3(9.4)      | 0(0.0)     | 0(0.0)      | 2(13.3)     | 1(16.7) |

X² = 7.488, Df = 3, P-value = 0.058

SBP = Systolic Blood Pressure. DBP = Diastolic Blood Pressure. CHOL = Cholesterol. HRS = Risk Score. X² is significant at P < 0.05

### Table 4: Logistic regression of independent variables against risk category

| Model                               | B       | SE b    | Beta    | Pearson’s r | T       | P       | Sr²    |
|-------------------------------------|---------|---------|---------|-------------|---------|---------|--------|
| Constant                            | -1.461  | 0.363   |         |             | 4.025   | 0.00    |        |
| Sex                                 | -0.033  | 0.074   | -0.039  | 0.067       | 0.441   | 0.660   | 0.004  |
| Age                                 | 0.050   | 0.043   | 0.107   | 0.219       | 1.171   | 0.245   | 0.048  |
| Smoking status                      | 0.528   | 0.224   | 0.102   | 0.180       | 1.154   | 0.252   | 0.324  |
| Alcohol intake                      | -0.120  | 0.085   | 0.128   | 0.064       | 0.160   | 0.160   | 0.016  |
| Systolic B P                        | 0.017   | 0.004   | 0.580   | 0.618       | 4.596   | 0.000   | 0.381  |
| Diastolic BP                        | -0.02   | 0.005   | -0.040  | 0.407       | -0.393  | 0.696   | 0.165  |
| Total cholesterol level             | 0.084   | -0.033  | 0.216   | 0.238       | -2.540  | 0.013   | 0.057  |
| Random blood sugar                  | 0.001   | 0.001   | 0.231   | 0.224       | -2.194  | 0.031   | 0.050  |

Dependent variable = risk category. SEb = standard error of mean; B= unstandardized beta coefficient, β = |Standardized beta coefficient, Sr²= Semi partial correlation coefficient

Quitting smoking can result in rapid reversals of risk status within a short time. For instance, health improvements can be observed within two years of quitting and CVD risk level returns to normal within 15 years [18]. Smoking cessation is a proven strategy to reduce cardiovascular risk and should be encouraged at all times. More than 50% of subjects were moderate drinkers of alcohol. The question of whether alcohol consumption reduces cardiovascular risk has been a subject of debate. Many studies have shown a U- or J shaped association between mortality and alcohol consumption. People who drink moderate amounts have a lower death rate than non-drinkers, while those who drink large...
amounts have a higher death rate [19, 20]. This is not to encourage the promotion of alcohol consumption as preventive therapy for cardiovascular disease as the deleterious effects of heavy alcohol consumption are well established [19].

Most of the subjects claimed to be physically active. This is justifiable because most persons in the study environment are farmers, fishermen and engage in rigorous activity associated with oil exploration. The cardiovascular benefits of regular moderate physical activity have been well demonstrated and should be encouraged across population groups [21-23]. Systolic blood pressure was significantly associated with high-risk category in both males and females. Elevated systolic blood pressure has been shown to increase the risk of cardiovascular events independent of diastolic blood pressure levels in the general population [24, 25] and in the elderly [26]. Logistic regression of independent predictor variables against risk category yielded systolic blood pressure, total cholesterol levels and comorbidities as greatest predictors of high-risk categories. This finding is also consistent with known risk factors for cardiovascular disease [24-27]. The proportion of subjects in the high-risk category was 6%. This result is comparable to that of other workers. For example, in Mongolia, prevalence rate of high cardiovascular risk was (6%), Malaysia (2.3%) and in Cambodia (1.3%) [11].

In order to maximize the benefits of cardiovascular risk assessment, risk profiles should be properly communicated to the patient. Therefore, efforts should be made by primary care providers and other professionals involved in risk assessment to communicate risk to the patient in a simple, clear, culturally sensitive manner that would motivate the patient to make the changes required to reduce his risk [7].

**Conclusion.** Cardiovascular risk assessment is feasible in community pharmacy setting and community pharmacy is a suitable site for performing cardiovascular risks assessment. Cardiovascular risks assessment should be included in the curriculum of undergraduate pharmacy students as well as mandatory continuing education program for pharmacists in order to increase pharmacists’ competence in cardiovascular risk assessment.

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