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A Study of Lifestyle Factors among Patients with Diagnosis of Multi-Morbidity in a Primary Care Setting in Western Nigeria

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Background

Multi-morbidity can be defined as the simultaneous occurrence of two or more chronic health conditions in the same person, without defining a primary disease [1, 2]. Most health systems have prominently pure single disease outlook. In these settings, multimorbidity was found to be associated with suboptimal care, increased mortality, poor quality of life and an increased demand on healthcare utilization [3,4,5,6,].

Globally, the estimated prevalence of multi-morbidity in adults is 25% [7, 8]. Most of the evidence on multi-morbidity relating to risk factors, prevalence and effects, comes from high income countries [7,8, 9] Few studies have been conducted in low and middle income countries [10, 11, 12]. There is therefore a need to conduct this study to contribute to the body of knowledge on multi-morbidity with the developing world in perspective as findings on multi-morbidity in developed countries cannot be utilized for formulation of management guidelines for multi-morbidity in developing countries. This is because of variations in the socioeconomic, behavioral and demographic milieu which determine the pattern and distribution of chronic diseases in these two different populations [13, 14]. Epidemiological and demographic transition in developing nations resulted in a "double burden" of infections/infestations and non – communicable diseases. This study shall therefore contribute to the much needed but lacking scientific evidence in the developing clime to dictate changes in health system management and policies to tackle these health challenges.

Available evidence indentified close relationship between lifestyle factors, chronic diseases and multi – morbidity [15 – 20]. The combination of preventive lifestyle factors has also been reported to prevent the occurrence of chronic medical conditions [21-24]. Several other studies also provided evidence on the association between individual lifestyle risk factors and multimorbidity; overweight/obesity [21, 25 – 29, 30], smoking [21, 31, 32, 33], heavy alcohol consumption [34], protective role of fruits and vegetables [35], physical inactivity [26, 39, 40] and chronic stress [36, 37, 38]. Two distinct trends emanated from these approaches. These include the association between several lifestyle facts and individual chronic diseases and the association between individual lifestyle factors and multimorbidity. It is therefore clear that the association of accumulating risk factors in the same individual with multimorbidity had not been given adequate attention even in the developed world not to talk of the developing nations [32].

The aim of the present study is to analyze the association between lifestyle factors and occurrence of multi-morbidity in the study population. We wanted to test the hypothesis that the accumulation of unhealthy lifestyle factors is associated with increased likelihood of multi-morbidity. Unhealthy lifestyle factors relates to lifestyles or behavioral characteristic or condition that increases the possibility of disease [20].

Study methods

Study design: This was a cross – sectional study.

Study setting: Participants recruited for this study were among patients attending the family practice clinics of Federal Medical Centre, Abeokuta, Ogun State, Nigeria. The Medical Centre Abeokuta provides primary, secondary and tertiary levels of care services to the people of Ogun State and neighboring states in western Nigeria. The state has a population of 3.7million going by the 2006 population census. In this 350 – bedded hospital,

the family practice clinic attendance was 23,010 between January to June 2014. This translates to a monthly average of 3825 and daily attendance of 127 patients. About 81.6% of clinic visits were made by revisits while the rest were new patients. Out of the revisits, 32.1% were for chronic diseases. The family practice clinic is headed by a Family Physician and trains resident doctors in Family Medicine for the two postgraduate medical colleges in Nigeria.

Inclusion criteria

Adult patients aged 25 years and above.

Willingness to participate and signing the informed consent form following understanding of the content.

Exclusion criteria

Acutely ill and severely ill patients. It was considered that this category of patients were unable to respond to the questionnaire in view of their challenging clinical state.

Sampling design

Study population consisted of patients aged at least 25 years who presented for routine ambulatory outpatient care. Systematic random sampling technique was employed in recruitment of participants for the study. From a sampling frame of 3835 per month, a sampling interval of every 12th patient led to the recruitment of 10 patients per day for 32 days. On a daily basis, the first 12 eligible patients presenting to the clinic were subjected to balloting to select the first participant. Thereafter every 12th patient was recruited until the 10th patient for the day was recruited. A total of 400 participants were approached to participate. From this number, 374 optimally completed questionnaires of eligible participants were subjected to statistical analysis. Predetermined minimum sample size was 320.

Data collection

Data collection was carried out with the use of a structured, pre-coded questionnaire administered by the principal investigator or his resident doctor assistant. Participants were assured of the confidentiality of the information they provided. Interviews were conducted in the language in which the respondent felt comfortable. The language is either English language or native language in Western Nigeria (Yoruba). Data were collected on participants' demographic and socio-economic characteristics, in addition to self- reported diagnoses (where applicable) and other information provided by respondents on their medical histories. At the end of the clinic day, questionnaires were matched with the patient records, from which were extracted additional information on each respondent's medical diagnoses and routine medications over a one year period. Only definitive diagnoses from participants self report in conjunction with case file extracts were used for the purposes of analysis. Participants with inconclusive information relating medical diagnoses were dropped and replaced with the next eligible patient. Data extraction was carried out by the researcher and a resident doctor in Family Medicine throughout the study period.

Dependent variables

The primary outcome, multi-morbidity, was determined using information from self reports of diagnoses and validation with participants' medical records. Multi-morbidity was defined as the co-existence of at least two of the 14 pre-selected chronic conditions within the same patient. These 14 conditions were selected following a review of the monthly morbidity returns at the hospital, which identified them as the most prevalent locally. These are: essential hypertension (or co – morbid with diabetes), musculoskeletal conditions, gastrointestinal conditions, type 2 diabetes mellitus (or co – morbid with hypertension), bronchial asthma, other cardiovascular conditions (congestive cardiac failure, stroke and ischaemic heart disease taken together with primary cardiac disease), cataract with primary disease, chronic obstructive pulmonary disease, allergic diseases of skin, nose or eye, sickle

cell disease, chronic anaemia, chronic liver disease, psychiatric disorders (anxiety, depression, somatisation disorder, sleep disorder) and benign prostatic hypertrophy.

Hypertension and type 2 diabetes mellitus were taken as individual entities if co morbid with each other to forestall selection bias and differential misclassification error. The group 'other cardiovascular conditions' included three possible diagnoses, namely ischaemic heart disease, congestive cardiac failure and stroke taken together with the primary disease. The term 'musculoskeletal conditions' referred to all types of arthritis and chronic back pain (lumbago), and 'gastrointestinal conditions' comprised chronic gastritis, tumours and chronic peptic/gastric ulcers While we used these groupings to conform to the routine hospital records, the specific diseases included in each group were selected based on the existing data at the hospital. For a condition such as anaemia that could be considered either chronic or acute, 3 months shall be defined as the minimum duration for a case to be classified as chronic. All conditions were recorded for analysis according to the documented diagnosis confirmed by the investigator or his assistant except for musculoskeletal conditions, cardiovascular conditions and gastrointestinal conditions, which were composite diagnoses as previously described.

Independent variables

Information on socio - demographic characteristics including age, gender, marital status, educational level, and income were reported by the participants. These variables are expected to be positively associated with multi-morbidity. In literature, multi-morbidity is shown to be associated with age and females usually have higher multi-morbidity prevalence than males [25]. It is also expected that socioeconomic status is associated with multi-morbidity [35, 36]. Occupation and education have been shown to be positively related to self-reported health [36, 37], thus we expect these variables to be negatively associated with multi-morbidity. Low income also has an inverse relationship with prevalence of multi-morbidity [36].

Age from last birthday were measured in single years from 25 years and included as a nominal variable (1 - young adult, 2 - middle age and 3 - elderly) to estimate relationships and as continuous variable to predict multi-morbidity form multiple logistic regression. Gender shall be categorized as 1 – female and 0 – male.

Socioeconomic classifications

There is no consensus on various socioeconomic classifications in Nigeria, because of the unstructured nature of the society. Ijezie and colleagues in Abia State, Nigeria [37] used monthly income and individual educational level as independent determinants of socioeconomic status (SES). Income included all possible sources of income available to the individual. Therefore, for the purpose of this study, respondents were categorized into three classes, according to their reported income. Low income earners were those receiving 18,500 Naira (₦) or less per month – the minimum wage in Nigeria. The middle income class earning ₦85,000 or less per month – about the salary level of a newly employed Nigerian graduate. The upper income class earned more than ₦85,000 per month, (one US dollar is equivalent to 150-160 Naira). Educational level was defined as the highest level of individual education completed, and was categorized into four groups: No formal education, primary, secondary and tertiary.

Reports on lifestyle risk factors of multi-morbidity

To measure obesity, the body mass index (BMI) was calculated from weight (measured in kilograms - Kgs) divided by height squared (metres – m^2). A BMI greater than 30 kg/m^2 was considered to be obese. A binary variable was thus generated, 1 if obese and 0 non – obese.

Information on smoking was obtained from the participants in the questionnaire using the modified Monica Smoking Questionnaire [38]. Response to the questionnaire by the participants were categorised them into 4 groups – (1.) regular smokers, (2) occasional

smokers, (3) past smokers and (4) no smokers. A binary variable was generated for logistic regressions analysis; 1 current smokers and 2 non smokers (groups 2, 3 and 4).

Alcohol intake was assessed in the questionnaire using the modified Five-Shot Questionnaire Alcohol Screening Test [39]. A score of 2.5 or greater indicates possible alcohol abuse (1) and less than 2.5 (0).

Exercise was assessed in the questionnaire using the modified Obligatory Exercise Questionnaire [40]. Participants' responses were used to categorise them into two groups – (1). Engaging in obligatory exercise and (2) Not engaging in obligatory exercise.

Stress was assessed by ASE questionnaire [41]. Scores equal to or more than 10 showed current stress (1). Scores 9 and below no current stress (0).

Dietary habit was assessed by a score adapted from Food Consumption Score and Healthy Eating Index [42, 43].

Intake of the following 8 food groups were assessed.

- Cereals, tubers, beans, nuts.
- Vegetables and leaves.
- Fruits.
- Dairy products and milk.
- Animal food ; meat and fish
- Oils, fats, butter.
- Sugar and sweet drinks.
- Excess salt intake; adding salt to food while eating.

Frequency of each food intake was assessed over the past seven days. For each item, participants were asked to indicate how many days they consumed the food item in the past seven days. The intake of food each group was scored as x/7.

Following the Dietary Approach to Stop Hypertension (DASH) guidelines [61], the 8 food groups were divided into healthy group, unhealthy and mixed group viz.

Healthy groups 1 – 4 (maximum score 28, minimum score 0)

Unhealthy groups 5 – 8 (maximum score 28, minimum score 0)

Mixed group if score in A is equal to score in B.

Each participant in the study was classified based on the class where the participant obtained the highest score.

It is expected that these lifestyle risk factors shall be positively associated with multi-morbidity as observed with chronic diseases [21].

Pretesting of questionnaire; The questionnaire was pretested on 30 participants in the general outpatient clinic of Federal Medical Centre, Abeokuta with the aim of refining the questions or clarify ambiguous questions.

Data analysis

All statistical analyses were done with STATA software version 12 (Stata Corp. Inc. TX, USA). Data from the completed questionnaires was inputted into Microsoft Excel 2010. The resulting datasets were cleaned and then be imported into STATA version 13 for analysis. Socio-demographic characteristics of the participants were described using proportions, percentages, and tables. Inference from relationship between dependent variable and independent variables were drawn from results of chi square analysis and odds ratio with 95% confidence intervals. The odds ratio and the corresponding 95% confidence interval showed the strength of association and the degree of precision of the estimate between individual independent variable and the dependent variable (multi-morbidity).

Multiple logistic regression modelling was used to predict the adjusted effect of socio - demographic characteristics and lifestyle factors on multi-morbidity. Since the relationship between the lifestyle factors and multi-morbidity is complex, the multiple logistic regressions helped to predict the strength of association between lifestyle factors individually and

collectively having adjusted for the effect of each lifestyle factor. A p – value of less than 0.05 was taken as statistically significant.

Ethical considerations

Adequate attention was taken to ensure confidentiality and maintain participation throughout the study period. There was no participant discrimination relating to language, educational level, occupation and ethnic group. Only the researcher had access to the link between nominal information and the unique study identification code. Participants freely sign an informed consent to participate in the study, and the individual's right to withdraw partially or completely was reiterated at data collection. The informed consent document was adequate, contained sufficient information, in simple language and clear. The study obtained ethical approval by Federal Medical Center Abeokuta ethical review committee. Risk of stigmatisation of the participants was mitigated by administering the questionnaire to the participants during normal clinic visit. Acutely or severely ill were excluded from the study as stated in the inclusion/exclusion criteria.

Results

A total of 374 optimally completed questionnaires were statistically interrogated. The prevalence of chronic diseases among the study population was 56.15% .The three most frequent chronic diseases were hypertension, musculoskeletal problems and diabetes mellitus (Table 1).

Multimorbidity was diagnosed in 26.74% of the participants. Among the participants with multimorbidity, the most frequent combinations of chronic diseases are as shown in Table 2.

The numbers of males and females participants were 168 (44.92%) and 206 (55.08%) respectively. There was no statistically significant difference between males and females in the occurrence of multimorbidity although females were 24% less likely to have multimorbidity than males (Table 1).

Age group analysis showed that 192 (51.34%) were in the age group 25 to 45, 148 (39.57%) in the age group 46 to 65 and 34 (9.09%) were above 65 years. The higher the age group, the more the likelihood of multimorbidity. Majority (52.41%) of the participants were in the middle income group. A higher income group was associated with lower likelihood of multimorbidity. Also, majority (64.71%) of the participants had tertiary education. Increasing educational level was associated with lower likelihood of multimorbidity. About eighty six percent of the participants were currently staying with a partner. Staying with partner had no statistically significant association with multimorbidity but 21% less likely to have multimorbidity.

In summary therefore, there was statistically significant relationship between occurrence of multimorbidity and older age group, higher level of education, low level of monthly income and low level of education (Table 3).

Lifestyle factors and multimorbidity

There was increased likelihood of multimorbidity with increasing BMI. Overweight participants had 77% increased likelihood of multimorbidity while obese participants had 87% increased likelihood of multimorbidity (Table 3). The data showed that smokers were over fourteen times more likely to develop multimorbidity than non smokers. Also participants who exercised had 57% less likelihood of developing multimorbidity than participants who did not exercise. There were no statistically significant relationships between alcohol abuse, stress, taking healthy diet and multimorbidity in this study.

After adjusting for confounders, multiple logistic regressions analysis showed that higher age group (OR 3.20, 95% CI 2.02 – 5.04), BMI >25 (OR 1.44 95% CI 1.06 – 1.97), exercise (OR 95% CI), smoking (OR 0.33, 95% CI 0.19 – 0.58) were predictors of multimorbidity occurrence.

Discussion

This study has revealed the distribution of chronic diseases and multimorbidity in the study population. We also determined the relationship of some socio-demographic variables and lifestyle factors with multimorbidity in a developing country setting.

In this study population, more than fifty percent of the participants had chronic diseases. The three most frequent chronic diseases were hypertension, musculoskeletal problems and diabetes mellitus. A similar study in Ghana in 2013 showed the same pattern [18]. Current evidences are supporting an increasing prevalence of chronic diseases in developing countries [16, 86]. In most developing populations, the burden of chronic disease has overtaken that of communicable disease partly because of success in reducing the latter, but tragically, also because poor countries are increasingly adopting the unhealthy lifestyles of the developed world.[16]) More research is needed to identify a full range of prevention-focused, cost-effective interventions against chronic diseases in the developing world.

A little over a quarter of all participants in this study were diagnosed with multimorbidity. We indentified a study in Ghana [18] with a prevalence of 38.8% and another one in India [44] with a prevalence rate of 57% in the rural elderly population. Although our prevalence rate of multimorbidity is less than these two populations, there is an urgent need to develop a holistic approach beyond the management of individual diseases to reverse the trend.

Gender analysis showed that there was no statistically significant difference between males and females in the occurrence of multimorbidity although females were 24% less likely to have multimorbidity than males. This is in agreement with a study in Australia [45]. Results of some other studies were at variance with this finding [13, 18, 46, 47]. Reasons for this increased risk in females may be due to genetic factors, living and working environments, life events, behavioural risk factors or the general risks associated with low socio-economic status [13]. In this study population, the increased likelihood of multimorbidity in males may be due to the fact that males utilize health services less than females and thus benefits of prevention efforts were less [24-26].

Increasing age was found to be a significant socio-demographic risk factor for multimorbidity. Our results showed that participants above 65 years were about eight and five times more likely to have multimorbidity than those in ages below 45 years and between 46 and 65 respectively. Similar trend have been almost conclusively proven in other studies. [46, 47]. While it is pertinent to give increased consideration to persons with multimorbidity, the elderly should be given particular attention relating to continuous and integrated care [48].

Our data showed that both education and occupation were associated with multimorbidity in the univariate logistic models only, and did not show any association with multimorbidity after adjusting for other factors. Similar conclusions were drawn by a Canadian study [49], which found only a crude association between education and multimorbidity. Socio-economic status (SES) is usually measured by determining level of education, income, occupation or a composite of these indicators [50]. The absence of a clear association could be due to the methods of assessment used, or due to the interplay between the influences of a sedentary lifestyle with higher SES, greater health awareness and improved access to health care — or the reverse scenario for participants with low SES [18]

Lifestyle factors and multimorbidity

Results of this study suggest an increased likelihood of multimorbidity with increasing BMI, smoking and lack of exercise. Previous studies showed significant association between lifestyle factors, either individually or collectively and individual chronic conditions. [23, 24 25, 36]. The evidence in this study associating increasing BMI with increasing likelihood of multimorbidity is supported by earlier studies [43 – 47, 62]. Similarly, several studies agreed with our finding of increased likelihood of multimorbidity among regular smokers [21, 31, 32, 52]. However, the results of Nadel and colleagues are at variance with our finding of an association of smoking habit and multimorbidity in men [24].

We found lack of exercise a modifiable risk factor associated with increased likelihood of multimorbidity. Our results confirmed several studies linking physical activity with the prevention of cardiovascular disease, diabetes mellitus, cancer (colon and breast), obesity, hypertension, bone and joint disease and premature death. [26, 3].

There exist several documented adverse effects of heavy alcohol consumption [54, 55, 56, 57]. Our results did not show any association between alcohol consumption and multimorbidity. This finding may be an underestimation of the true effect size as the study sample was drawn from primary care clinic. A different finding is likely in a study conducted in specialist set up where patients with complications of heavy alcohol consumption are managed. Further research in this regard is advocated.

Despite current scientific evidence suggesting a protective role for fruits and vegetables in prevention of many chronic diseases [25, 58, 59, 60], we did not find a significant association between nutrition and multimorbidity in the participants. In this environment, encouragement and motivation should be continued for current dietary practices.

Evidence abound on the adverse effect of chronic stress on the immune, cardiovascular, neuroendocrine and central nervous systems with resultant increase on the risk of a range of chronic diseases; mental health problems (insomnia, anxiety, depression), musculoskeletal diseases (osteoarthritis, osteoporosis), cardiovascular diseases, (hypertension, coronary heart disease), weakened immune system (infections), cancers, obesity and HIV/AIDS [61,62,63]. However, in this study, we did not find a significant relationship between chronic stress and multimorbidity. This study design was not appropriate to define this relationship. A case – control study is proposed for further assessment of this relationship.

The results of this study supporting the link between lifestyle factors and multimorbidity point to the hypothesis that preventive measures could be considered an intervention in the fight against multimorbidity. An effective approach is an individualized paradigm. A person-centered approach promoting healthy lifestyles would maximize the number of healthy lifestyles in each individual using behavioral change models [64, 65].

Study limitations

This hospital based cross sectional design should be interpreted with caution to the community. In addition causal inference cannot be made between the explored dependent and independent variables in our study. The administration of the study questionnaires may likely result random misclassification. The crude dichotomous categorization of some lifestyle factors might underestimate the true effect of the various risk factors.

These limitations should be balanced against the strengths of the study, including the systematic random sampling, two group comparison and analytical methods used for the study data.

Conclusions

This study showed the distribution of chronic diseases and multimorbidity in our setting. The results provide support for the association of unhealthy lifestyle factors and multimorbidity. The increase in the likelihood of multimorbidity with the combined effect of unhealthy lifestyle factors may be used to hypothesise that the promotion of health positive lifestyle factors could be an intervention in the fight against multimorbidity.

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Tables

Table 1. Frequency of the chronic diseases in the study population

Chronic disease	Number	Percentage
Hypertension	112	29.95%
Diabetes	42	11.23%
Musculoskeletal	74	19.79%
Copd	0	0
Asthma	12	3.21%
Sickle cell	2	0.54%
BPH	6	1.60%
CVD	2	0.53%
Chronic Liver disease	0	0
GIT	9	2.41%
Psychiatric diseases	12	3.21%
Cataract	6	1.60%
Allergy	27	7.22%

Table 2. Common chronic diseases multi-morbidity distribution

Chronic Diseases Multi-morbidity	Number of participants
Hypertension and musculoskeletal conditions.	28
Hypertension and diabetes mellitus.	26
Diabetes Mellitus and musculoskeletal conditions.	16
Musculoskeletal conditions and psychiatric disorders.	10
Three chronic diseases	9

Table 3. Socio-demographic variables and multimorbidity

Variable	Multimorbidity	No multimorbidity	P value	OR (univariate analysis)
Gender				
Male	50	118	0.233	0.76
Female	50	156		
Age group				
25 – 45	24	168	0.001	1
46 – 65	58	90		4.57
>65	18	16		8.04
Income				
≤ 18,500	28	34	0.001	1
18,501 – 85,000	40	156		0.31
≥85,501	32	84		0.45
Education				
None	8	6	0.001	1
Primary	14	16		0.66
Secondary	28	60		0.35
Tertiary	50	192		0.20
Staying with partner				
No	16	36		
Yes	84	238	0.479	0.79

Table 4. Lifestyle factors and multimorbidity

Variable	Multimorbidity	No multimorbidity	P value	OR
BMI				
<24.99	36	140	0.035	1
25 – 29.99	26	56		1.77
>30	38	78		1.87
Smoking				
No smoker	95	273	0.002	14.37
Smoker	5	1		
Alcohol abuse				
No	96	258	0.484	0.67
Yes	4	16		
Exercise				
No	74	150	0.001	0.43
Yes	26	124		
Stress				
No	74	210	0.60	0.87
Yes	26	64		
Healthy diet				
Mixed	20	52	0.94	1
No	36	96		0.96
Yes	44	126		0.90

Table 5. Multiple logistic regressions analysis

Multimorbidity	Odds Ratio P value 95% confidence interval
Education	0.096 0.625 0.578 – 1.310
Income	0.073 0.600 0.525 – 1.449
Age Group	3.196 0.001 2.023 - 5.050
BMI group	1.443 0.020 1.051 – 1.967
Smoke	0.211 0.090 0.720 – 93.075
Exercise	0.327 0.001 0.185 – 0.575

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