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## **1.1 Introduction**

There is a suggestion fronted by Hollon et al. (2014) that patients suffering from depression are traditionally treated using psychiatric interventions such as anti-depressants to rein in the symptoms. According to Coupland (2011), antidepressants are often prescribed during primary care. Normally, anti-depressants are administered to attain a state of chemical balance in the brain by “increasing monoaminergic neurotransmission” (Andrade and Rao, 2010). However, there is a concern that the use of anti-depressants may predispose a person to diabetic infections. Physiologically, the body regulates glucose levels in the blood through metabolism. Notably, anti-depressants slow down metabolism rates implying a gradual increase of glucose in the body accompanied by other changes such as weight gain (Nelson and Spyker, 2017). Bradshaw and Mairs (2017) attempt to show the inter-relation between antidepressants and an increased likelihood of being diabetic. They premise their argument on patients becoming overweight or obese. Consequently, the blood sugar level increases due to low metabolism rate caused by limited movement due to weight problems (Barnard, Peveler and Holt, 2013). Notably, the use of antidepressants is increasing significantly though patients may not be aware of adverse side-effects in the long term, for instance, the risk of diabetic conditions arising. Therefore, it is important to showcase the risk(s) associated with the increased use of antidepressants focusing on the probability of diabetic symptoms or conditions emerging. Further, factors such as lifestyle and physiological processes are explored in depth to determine how they catalyse type 2 diabetes. Eventually, the study will posit recommendations on measures that stakeholders and individuals need to take to minimise the risk of diabetes either when prescribing or using antidepressant drugs.

## **1.2 Aim and objectives of the research**

The main aim of this research study is to determine how use of antidepressants may lead to a type 2 diabetes. The objectives of the research are outlined below;

- i) To evaluate the association between antidepressant usages and type 2 diabetic symptoms considering biological factors such as metabolic rate and weight.
- ii) To inform patients/stakeholders on how extended consumption of antidepressants can increase the risk of diabetic conditions
- iii) To advise and guide the practitioners on the necessity of monitoring antidepressant users in preventing adverse side-effects such as diabetes.

### **1.3 Literature review**

Individuals using antidepressants to suppress depression are at risk of developing symptoms that are diabetic as asserted by Wu, Gau, and Lai (2014). According to Leo and Lacasse (2017), a moderate to high consumption of antidepressant drugs on a daily basis throughout two or more years increases the risk of diabetes. Patients using selective serotonin-reuptake inhibitor tricyclic antidepressant doses have a high potential of becoming diabetic (Macedo et al., 2014). Kivimaki et al. (2010) intuit that, “continuing antidepressant use might increase the risk of type 2 diabetes, as an unwanted side effect” (p. 2611). A major risk factor and key mechanism responsible diabetes cases are weight gain which is closely associated with antidepressant use. In their study, Kivimaki et al. (2010) found out that, “antidepressant use was associated with increased risk of incident diabetes in both participants with no indication of severe depression and participants with severe depression” (p. 2612). The same study found out that a weaker association existed between severely depressed patients and incident diabetes where antidepressants were not used. Depressed patients that have combined antidiabetic and antidepressant medication have a high probability of minimising diabetes’s predisposing factors (Petersen et al., 2016).

Semenkovich et al., (2015), debates that the risks of diabetes can be minimized through physical activities and exercise to achieve optimum weight. Patients undergoing antidepressant therapy should comply with these lifestyle habits to prevent diabetes (Mars et al., 2016).

Thousands of people in the UK taking antidepressants are at risk of developing diabetes. Tajima et al., (2015) argues that a recent study involving approximately a million participants, shown that patients under antidepressants pills are at high risk of diabetes. The patients under antidepressants have high chances of being obese putting them at more risk to develop diabetes than healthy people (Medici, McClave, and Miller, 2016). In the UK the number of persons taking antidepressants has risen for the last decades. Experts urge that doctors handle the antidepressants drugs freely without minding the most probable side effects to patients (Coupland et al., 2016).

Many patients develop type 2 diabetes after antidepressant prescription, suggesting that the pills cause the disease (Hill et al., 2015). Antidepressants lead to weight gains worsening the ability of the body to regulate blood glucose/sugar triggering diabetes (Deuschle, 2013).

According to Berge et al., (2015) the possible risk of the pills is terrifying and creating awareness to individuals at risk is crucial. While the clinicians administer the pills as the effective treatment for depression, they should be aware and concerned about the risks of diabetes in long-term use of the drug (Mohammad and Ahmad, 2016). Doctors ought to be aware of the risks associated with antidepressants, and therefore implement measures that can monitor diabetes for depressed patients and advise them how to minimize the possibility through lifestyle practices such as exercise (McLellan et al., 2014).

#### **1.4 Methodology**

The data collected was divided into two categories; primary and secondary data. Primary data was collated by issuing out questionnaires; quantitative semi-structured to randomly sampled hospitals in London (Waterworth et al., 2015). Both closed and open-ended questions were incorporated in the questionnaires. Care was taken to ensure no leading questions were included to avoid participants respond in a particular way that suits the study. This would lead to biased responses hence compromise the validity of the study. For this particular study, the

respondents targeted involved patients undergoing antidepressants therapy, diabetic patients and medical practitioners in the depression and diabetes treatment department. On the other hand, secondary data which supplements primary data was sourced through reviews of qualitative and quantitative research materials related to the content of this research for purposes of comparison (Doody and Noonan, 2013).

Notably, face to face interviews was carried out with doctors and clinicians in the health centres to get first-hand information about their experience in relation to dealing with depression cases and incidences of diabetes arising from antidepressant treatment. These interviews were also recorded with the consent of the respondents for purposes of retrieval when compiling this report. In addition to that, documents from the hospital archives were useful in monitoring the trend of depressed patients undergoing long-term treatment. Ideally, variables such as weight gain, body metabolism rate, and blood glucose levels were checked. The interview and questionnaires were administered using a random procedure at randomly selected health centres in London.

A convenience sampling procedure was applied where a total of 100 participants selected from 5 hospitals were targeted with an expected minimum response feedback rate of 80%. To ensure gender equity, participants were selected on 50% basis, that is, both male and female. Apart from gender criteria, participants between early 30 and 60 years were selected. This was to determine the prevalence of diabetes cases across the selected age bracket for antidepressant users. Finally, information gathered using the criteria stated above was presented using statistical tools including charts and tables.

### **1.5 Risks and Ethical clearance**

This study was conducted by integrity principles implying that sources of information (selected hospitals) are recognised by the UK government. Importantly, there were protocols that had to be observed before reaching out to participants. First, consent from the hospital

administration was sought using an authorization letter from the Department of Biological Sciences so as to enable easy contact with prospective respondents including the hospital management, doctors, and clinicians (Robinson, O.C., 2014). Second, an informed consent form was presented to participants to allow them to know what constitutes the study and seek their approval before proceeding; for those conducted online, the form was attached to the questionnaire. As a way to approve their consent, the participants signed the forms. However, participants were not required to identify themselves when filling the forms for purposes of confidentiality. Names of participants that might have appeared in the interview forms were removed from the questionnaires and interviews consent form before data entry for confidentiality purposes. In addition to that, code numbers proved helpful in identifying the respondents for purposes of analysis. All participants were assured that the information they provided would be kept confidential and protected. Prior to conducting interviews with patients, leading doctors and/or nurses were requested to converse with patients and identify those that were willing to participate. This made it easier to know the respondents of the study and further helped in building a cordial relationship.

### **1.6 Data analysis technique**

One key thing that was considered in data analysis was to ensure that preliminary data analysis was performed to ensure scale reliability among the respondents (doctors and patients) in order to ascertain that the responses did not violate the feedback mode (Holloway and Galvin, 2016). Interview and questionnaire data and findings formed the core of the data collection though secondary data proved helpful in the analysis to help assess all variables at play with reference to the research question (Twisk, 2013). Before the data is analysed, comparison of responses from different health centres will be carried out to ascertain any systematic difference. Empirical data from the respondents were analysed using statistical software; specifically, the Microsoft Excel 2007 and SPSS (Elliott, and Woodward, 2014).

Concisely, a descriptive statistics procedure was involved in the conversion of data collected into measures such as frequencies, standard deviation, percentages and mean. More so, bar charts, tables, and pie charts have been used in presenting the study findings in a simple and easy-to-understand mode (Albert and Tullis, 2013). Three levels of metabolism rates were measured and recorded commensurate to levels of antidepressant consumption, that is, low, medium, and high. The weights of the patients were determined at intervals of one year for a period of 5 years. More so, the prevalence of diabetes over the selected age range was assessed.

### **1.7 Hypothesis and expected outcome**

Being an empirical study, this study implies a test of hypothesis with results or findings either supporting it or rejecting it. The hypothesis is stated below

**Original Hypothesis:** Long term use of antidepressants increases the risk of developing diabetes.

**Null Hypothesis:** Long term use of antidepressants does not increase the risk of developing diabetes.

Analysis of the findings of this study has been used to support or reject the supposition that prolonged usage of antidepressants can lead to diabetes or diabetic conditions.

### **Findings and analysis**

Conveniently, the overall feedback rate was estimated to be approximately 85% (85 participants). The female gender recorded the highest feedback rate compared to men; 90% for women against 80% for men. The total number of patients that provided substantial feedbacks were approximately 70. It means that 15 respondents consisted of doctors and clinical practitioners. It was found out that severely depressed patients that heavily consumed antidepressant drugs gained weight gradually because of limited movement. Approximately, half of the respondents (35 participants) stated that they consumed antidepressant doses at a medium level. Twenty participants said that they use antidepressants mildly while 15

participants were considered to be high users of the drugs. There was also an observation that the old patients using antidepressants were more diabetic prevalent compared to the young patients. This is further supported by the Table I below which shows the diabetes prevalence of adults above 20 years in the US between 2011 and 2012 (Menke et al., 2015).

Interestingly, the weight gain was more manifest upon individuals between above 30 and below 55 years. It was observed that weight gain over this span or years coupled with consumption of antidepressant drugs increased the risk of diabetes cases occurring. It is worth noting that the metabolism rate reduced gradually with male participants (about 45 percent) recording the highest BMI levels and maximum weights recorded. Ten participants had normal weights while 15 medium weights. The relation between weight and age is supported by Lazzer et al., (2009) as shown in Table 2 below. Another important observation made was that male patients experienced more weight gains than women.

Table 1 shows diabetes prevalence across age groups

	Total No.	No. With Diabetes <sup>a</sup>	Total Diabetes Prevalence % (95% CI) <sup>b,c</sup>	P Value <sup>d</sup>	Diagnosed Diabetes Prevalence % (95% CI) <sup>b,e</sup>	P Value <sup>d</sup>
Overall prevalence <sup>f</sup>	2623	971	14.3 (12.2-16.8)		9.1 (7.8-10.6)	
Age group, y						
20-44	998	139	5.0 (3.8-6.7)		2.7 (2.0-3.6)	
45-64	964	432	17.5 (14.4-21.0)	<.001	11.6 (9.5-14.0)	<.001
≥65	661	400	33.0 (27.1-39.4)		21.3 (18.1-24.9)	
Sex						
Male	1334	495	15.4 (13.2-17.9)		9.9 (8.9-11.0)	
Female	1289	476	13.8 (11.4-16.6)	.20	8.7 (7.1-10.8)	.15
Race/ethnicity <sup>g</sup>						
Non-Hispanic						
White	948	279	11.3 (9.0-14.1)		7.5 (6.2-9.1)	
Black	676	323	21.8 (17.7-26.7)	<.001	14.9 (13.0-17.0)	<.001
Asian	369	125	20.6 (15.0-27.6)		10.0 (7.2-13.9)	
All Hispanic	561	219	22.6 (18.4-27.5)		12.5 (9.5-16.2)	
Mexican American	282	105	23.8 (19.1-29.2)		14.4 (10.7-19.2)	

Table 2 shows weights and BMI for adolescents and middle-aged individuals

	Children and adolescents (n = 1,412)			Adults (n = 7,368)		
	Females (n = 823)	Males (n = 589)	P value <sup>a</sup>	Females (n = 5,368)	Males (n = 2,000)	P value <sup>a</sup>
Age (years)	14.5 (2.1)	14.0 (2.3)	0.006	47.8 (13.9)	46.3 (13.8)	<0.001
Body weight (kg)	94.1 (19.4)	102.4 (26.8)	<0.001	105.8 (17.5)	123.9 (22.6)	<0.001
Height (m)	1.60 (0.10)	1.70 (0.10)	<0.001	1.60 (0.10)	1.70 (0.10)	<0.001
BMI (kg/m <sup>2</sup> )	36.6 (6.0)	36.7 (6.6)	0.740	41.9 (6.5)	41.6 (6.8)	0.098
z-BMI (SDS)	3.0 (0.5)	3.0 (0.7)	0.056	—	—	—
FFM (kg)	44.4 (8.8)	51.3 (13.5)	<0.001	53.4 (9.0)	78.2 (14.4)	<0.001
FM (kg)	49.7 (10.7)	51.1 (13.6)	0.042	52.4 (8.6)	45.8 (8.5)	<0.001
FM (%)	52.7 (1.5)	49.8 (1.9)	<0.001	49.5 (1.0)	36.9 (1.4)	<0.001
BMR (kJ)	7,652 (1,246)	9,101 (1,826)	<0.001	7,418 (1,255)	9,409 (1,723)	<0.001

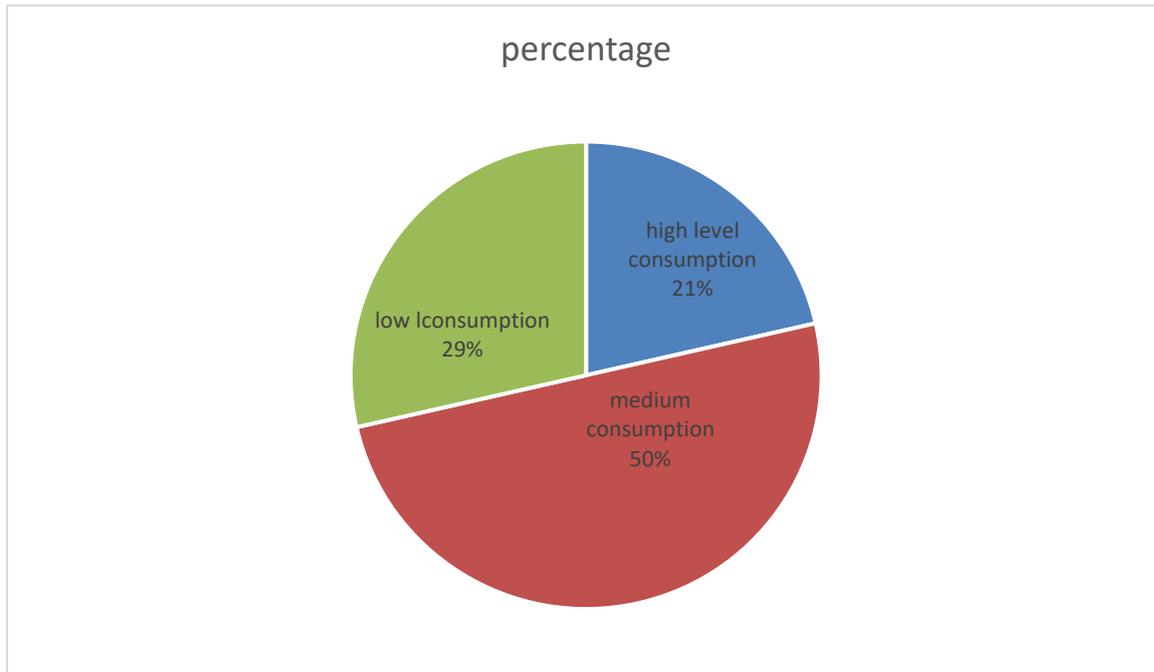
The table 3 below shows relationships between consumption of antidepressant drugs, basal metabolic rates, and weight gain

Level of consumption	Basal Metabolic Rates	Weight gain	Glucose level in the body
High or overdose (15)	Low	Overweight/obese	High
Medium (35)	Medium	Medium	medium
Low/mild (20)	High	Negligible/small	low

The table below shows weight gain for patients using antidepressants (same consumption level) in a span of 5 years from the youngest age bracket to the oldest

Depressed patients Age bracket	Weight gain (kg) in 5 years span
30-35	8
35-40	10
40-45	13
45-50	15
50-55	14
55-60	9

The chart below shows antidepressant-glucose levels based on Table 3 data



## Conclusion

From the findings, it can be concluded that the alternative hypothesis holds that long-term use of antidepressant drugs can predispose patients to diabetes risk. Particularly, the risk is associated with two key variables, that is, weight gain and basal metabolic rate. It is also clear that age differences are influential concerning antidepressant patients risking to get diabetes. The older patients with a higher weight gain and limited movement are likely to have sugar levels increased quickly within a short time hence the risk of type 2 diabetes. More so, male patients were more vulnerable to diabetes risk compared to females because of weight gain and high consumption rate of antidepressants. Therefore, the objectives of the study were successfully achieved, and this forms an important basis on which patients and medical personnel can be involved in campaign awareness about the association between antidepressants consumption and risk of diabetes. Patients need to be informed of adverse side-effects of using antidepressants for a long time without monitoring by practitioners. If possible, the medical personnel need to check closely on physiological and biological parameters such as weight gain, BMI, basal metabolic rate, and sugar levels in order to ensure predisposing

factors that may lead to diabetes are firmly dealt with. On the other hand, patients can decide in following up with medical check-ups where the said body parameters are constantly checked in addition to living a recommended lifestyle. It is important to be involved in activities that improve the overall health condition of the body such as health eating, resting, and exercising regularly.

### **Limitation**

The following were limitations of this study;

- i) Logistical challenges moving across the five health institutions
- ii) The fear among participants that their information would be opened to the public even after assurance with the consent form
- iii) Lack of enough resources such as research materials including questionnaires, consent forms, renting of books, and purchase of audio-recording devices
- iv) There was a big challenge setting up interviews with hospital administration and senior doctors because of their busy schedules hence ample time to discuss with them was not available

### **Recommendation**

With findings showing that antidepressants can lead to diabetes risks among patients, various stakeholders are bound to take appropriate steps and measures in creating awareness among patients. The medical personnel needs to play a role of information agents by equipping patients with knowledge on the importance and side-effects of using antidepressants for a long time. Ideally, patients need to be made aware of such risks occurring before antidepressants are administered. Further, they need to be told about other major factors that can lead to diabetes risks for patients consuming antidepressants and this include lifestyle activities, eating habits, and monitoring of weight gain. Some of these initiatives are personal driven and require strong commitment from people.

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