



ORIGINAL RESEARCH

Cost Effectiveness Analysis of Antipsychotic Medications in the Management of Schizophrenia in Benin City

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ABSTRACT

Background: Studies on cost effectiveness analysis (CEA) of typical versus atypical antipsychotics in the management of schizophrenia are still lacking in Nigeria thus the objectives of this study are to determine which of the class of antipsychotics is more cost-effective as well as the impact of socio-demographic factors on the response rate to antipsychotics.

Method: The effectiveness was measured by Brief Psychiatric rating scale (BPRS) and costs were in Nigerian naira (NGN). The impact of different socio-demographics on the mean BPRS score \pm Standard deviation (SD) reduction was determined. The study was conducted from patient's perspective with decision tree analysis model using two-way sensitivity analysis. The model was used to explore incremental cost effectiveness ratios (ICER) of oral antipsychotic medications Haloperidol /Trifluoperazine versus Olanzapine /Risperidone over a 24-week study period.

Results: Cost effectiveness analysis with 1st scenario sensitivity test of medications, trifluoperazine 17.81 ± 2.51 mg is more cost effective than olanzapine 10mg, while haloperidol 10mg is more cost effective than risperidone 3.5 ± 0.51 mg. In the second scenario of sensitivity analysis, olanzapine is more cost effective than trifluoperazine only when the savings of making one person free from schizophrenia in a month is worth more than NGN537 while risperidone is more cost effective than haloperidol only when the savings of making one person free from schizophrenia in a month is worth more than NGN2524.1. The effect on response rate to antipsychotics gave $p=0.0251$, $P=0.009$, $P<0.0001$ for educational status, income, stable relationship respectively.

Conclusion: Atypical antipsychotic medications are not more cost effective compared to the typical antipsychotics. Higher educational level, income and stable relationship positively affected the outcome of effectiveness of antipsychotics.

Keywords: Cost-effectiveness, schizophrenia, antipsychotics, medications, decision tree

INTRODUCTION

Schizophrenia is one of the psychiatric illnesses that can be debilitating and may require long life treatment. According to the American Psychiatric Association's Diagnostic Statistics Manual of mental

disorders (DSM V), schizophrenia can only be established if an individual suffers from at least two diagnostic criteria such as psychotic disorders, delusions, hallucinations, disorganized speech, disorganized or catatonic behaviour and negative symptoms over much of the time of a period of at least

one month with a significant impact on social or occupational functioning for at least six months¹. The socio-economic impact of schizophrenia on the sufferer, caregiver and the society at large is enormous leading to loss of productivity, reduction in life span of the patients among others^{2,3}. The ever-expanding science is constantly researching into new and improved drugs to treat psychiatric disorders. In this way, health professionals are continuously exposed to newly introduced atypical antipsychotics like olanzapine and risperidone that are claimed to be safe and more efficacious than the typical antipsychotics such as haloperidol and trifluoperazine⁴.

Cost Effectiveness Analysis, one of the analytical models in pharmacoeconomics, can be used to compare costs of achieving particular clinical outcomes or of reducing symptoms of schizophrenia of antipsychotics^{5,6}. Most frequently applied approaches in analysis are decision trees and Markov models while less frequently used approaches include discrete event simulation, dynamic transmission models, partitioned survival models and compartment models⁵. It was also estimated that about 21.7 million people need treatment for schizophrenia in low- and middle-income countries of which Nigeria is one of the countries⁷ and in the three developing countries of India, Colombia and Nigeria, only 16% of the patients were regularly maintained on antipsychotics, compared to 61% of patients in the developed countries⁷.

In a resource limited country like Nigeria, adopting antipsychotic medication that are cost-effective and affordable, in addition to the traditional three hurdles of safety, efficacy, and of high quality, will help to ameliorate these challenges mentioned above, save lives and the nation's dwindling economic resources therefore the need for cost effectiveness analysis of antipsychotic medications used in the management of schizophrenia in Nigeria which are scarce in the country. The study was designed to determine the cost-effectiveness of typical antipsychotics (haloperidol and

trifluoperazine) versus atypical antipsychotics (risperidone and olanzapine) in the management of schizophrenia and to identify the impact of socio-demographic factors on the response rate to antipsychotic therapy.

METHODS

Setting

The study was conducted in the two tertiary hospitals in Benin City, Nigeria. The City is located at 6.34 latitude and 5.63 longitude, with land mass 1204km sq. and it is situated at elevation 88 meters above sea level and with a population of over 1.2 million people from 2006 national population census commission's report⁸. The hospitals are Federal Neuro-Psychiatric Hospital (FNPH) which has over 250 bed spaces and the University of Benin Teaching Hospital (UBTH) with a capacity of over 800 beds. Each hospital has in their employment consultant psychiatrists, physicians, pharmacists, nurses, psychologists among other health professionals. Prospective cohort design of 6 follow ups of every 4 weeks per patient after the initial contact was established.

Ethical approval for the study was granted by the two health institutions. The reference No for Psychiatric hospital is PH/A.864/vol.vii/12 while that of UBTH is ADM/E22/A/vol.vii/1422. Recruitment of participants was on voluntary basis and written consent of all participants in this study was obtained. The content of the consent form was clearly read out and explained to each patient with opportunity for them to ask questions to clear up any misconceptions. Interpreters were used to clearly explain the content of the consent form to illiterate persons. All participants were assured of the confidentiality of the information provided. The consent form was signed by each participant recruited for the study or where the participant is illiterate, by his or her caregiver.

Inclusion criteria were patients on outpatient basis diagnosed for schizophrenia by

consultant psychiatrist, 18 years and above and receiving antipsychotic medication treatment while schizophrenic patients comorbid with other medical condition(s) who were prescribed antipsychotics with other medications were excluded. Only consenting subjects were enrolled in both facilities.

Sample size and sampling technique:

Using prevalence rate of 1.2% of schizophrenia in Nigeria⁹, with formula $n = \frac{Z^2 P(1-P)}{d^2}$ where n= sample size, Z statistic for a level of confidence (95%) that is 1.96, P= expected prevalence (1.2%), d= precision (2%), the sample size in each setting was 114 respondents amounting into 228 patients in total. Patients who came to the hospitals' pharmacies to fill their prescription during the first three months of inception of data collection were systematically randomised using a sampling interval of three.

Method of data collection

In both settings, data were collected through face-to-face contacts every four weeks until the 24th week for each respondent using a self-developed questionnaire that comprised three sections. Section A of the instrument contains socio-demographic factors, section B assessed costs including cost of drug, cost of managing side effects of the medication taken by the respondents, transportation cost to the health institutions and loss of productivity while section C which is a validated instrument⁹, Brief Psychiatric Rating Scale (BPRS) was employed to measure the antipsychotic effect of the medications used in this study.

Sections A and C were self-completed by the respondent or respondent's care giver, to avoid interviewer bias after detailed explanation of the items in these sections while section B was completed by the investigator.

Section C comprising the BPRS has in it 18 item Likert scale of symptoms of 0-7 where scale 0 represents not assessed and scale of 7 meant extremely severe and each item was accompanied with explanation. The symptoms were somatic concern, anxiety, emotional withdrawal, conceptual

disorganization, guilt feelings, tension, mannerisms and posturing, grandiosity, depressive mood, hostility, suspiciousness, hallucinatory behaviour, motor retardation, uncooperativeness, unusual thought content, blunted affect, excitement and disorientation. Data collection from FNPH took place from 12th December 2016 to 29th September 2017, while samples from UBTH were collected from 5th February 2018 to 22nd November 2018.

Costs assessment

Each respondent' cost of medication per month was assessed irrespective of the brand name then average drug cost in Naira (NGN) per month per medication given to respondents during the period of study was calculated by adding up cost of a specified drug per day of all the respondents multiplied by 4 weeks then divided by the number of respondents taking that medication. This was done for each follow up. The mean cost of medication for a period of time was cumulative cost from the beginning of the study to the period considered (24 weeks) e.g., the cost of taking olanzapine for the first follow-up is the cost of olanzapine for the first contact plus the first follow-up.

Mean cost in Naira (NGN) of treating or managing side effects of patients on a particular antipsychotic was estimated by noting the cost of prescribed tablet benzhexol or injection Biperidine and/ or other cost of symptomatic management of the side effects during the study. Cumulative mean cost of managing the side effects of the medication was determined. Cumulative mean cost of transportation of patient (with that of caregiver when the respondent was being accompanied to the hospital) was also documented.

Average loss of productivity in Naira (NGN) over the time of study of respondents on a particular drug was determined by finding the patient's actual salary or wages in a month divided by the amount of time lost during working hours as a result of either side effects of the medication or due to symptoms of schizophrenia not yet resolved by the medication.

Outcome Measures

The Brief Psychiatric Rating Scale (BPRS) was employed which ranged from a score of 18 to 126 where the minimum value depicts when an individual is free from the aforementioned psychiatric symptoms while the maximum value is seen when an individual had all the symptoms in extremely severe form. The effect considered was the cumulative reduction in BPRS during the period of study. A sharp decrease in the total score of BPRS suggests a better effect (outcome) of management of schizophrenia than when there is slight decrease in BPRS, while no change in BPRS mean there is no change in schizophrenic mental status.

Data Analysis

Data collected was entered, sorted and descriptive analysis done using Microsoft Excel. GraphPad instat version 3.10 was employed for inferential analysis. A p-value of less than 0.05 was considered significant. The significant impact of different socio-demographics on the mean Brief Psychiatric Rating Scale (BPRS) score \pm SD reduction of respondents' symptoms was determined using student t-test or one-way analysis of variance as applicable.

Pharmacoeconomic evaluation

The economic analysis was conducted from patient's perspective. No discounting is necessary as cost and effect were measured within one year. At the end of the 24 week study period, cost effectiveness analysis was conducted employing the dose equivalent of antipsychotic medications in each of the two groups of drugs studied^{12,13}, where group 1 comprise tablet haloperidol 10mg, tablet trifluoperazine 17.81 \pm 2.51mg tablet risperidone 3.5 \pm 0.51mg and tablet olanzapine 10mg while drugs in group 2 were tablet haloperidol 5mg, tablet trifluoperazine 10mg, tablet risperidone 2mg and tablet olanzapine 5mg. The only difference in the drug grouping was doses which were generally higher for group 1. The choice of drugs used was informed by the availability of such medication in the study sites while

dosage regimens chosen was based on dose therapeutic equivalent of antipsychotics^{14,15}. Decision tree analysis model was constructed with TreeAge Pro 2019 R1.0. The model contains complete patient pathways that require no repeating cycles. Same efficacy^{14,15}, that is the ability to produce a desired antipsychotic effect was assumed for the medications studied hence the probabilities in patient pathway was 0.75 (efficacy) for getting well and 0.25 for not getting well for each of the medications employed. Using the analytical model, the incremental costs, incremental effects, incremental cost effectiveness ratios (ICER), cost effectiveness ratio for each comparison of medications was determined.

Two way sensitivity analysis was conducted where the first scenario of the analysis was plus one-tenth (+10%) of the initial effects of oral typical antipsychotics (haloperidol, trifluoperazine) with less of one-tenth (-10%) of the initial effects of oral atypical antipsychotics (risperidone, olanzapine), while the second scenario was when the outcome of oral typical antipsychotics (haloperidol, trifluoperazine) was reduced by one-tenth (-10%) of its initial value with one-tenth (+10%) increased in the initial outcome of oral atypical antipsychotic i.e. risperidone, olanzapine. This sensitivity analysis was conducted for each of the group of medications studied.

RESULTS

Participants from FNPH, UBTH were 180 (56.1%), 141(43.9%) respectively giving 321 patients in overall sample used. Participants who had post-secondary were more in number, as their highest level of education were 113 (35.2%) and in UBTH sample, 66 (46.8%) while in FNPH, 59 (32.8 %) of respondents who could not attain above secondary level of education had the highest number. Respondents, 71 (22.1%) had no personal income which comprised 55 (30.6%), 16 (11.5) in FNPH, UBTH respectively (Table 1).

Table 1: Baseline Socio-demographics of respondents

VARIABLES	ITEMS	TOTAL (n=321)	FNPB (n=180)	UBTH (n=141)
		Freq. (%)	Freq. (%)	Freq. (%)
Sex	Male	195 (60.75)	106 (58.89)	89 (63.12)
	Female	126 (39.25)	74 (41.11)	52 (36.88)
Age (years)	≤20	28 (8.64)	20 (11.11)	8 (5.67)
	21-40	159 (49.5)	83 (46.11)	76 (53.91)
	41-60	78 (24.30)	60 (33.33)	18 (12.77)
	≥61	56 (17.45)	17 (9.44)	39 (27.66)
Education	Primary	52 (16.20)	29 (16.11)	23 (16.31)
	Secondary	100 (31.15)	59 (32.78)	41 (29.08)
	Post-secondary	113 (35.20)	47 (26.11)	66 (46.81)
	Postgraduate	56 (17.45)	45 (25.0)	11 (7.80)
Monthly Income (NGN)X1000	No personal income	71 (22.11)	55 (30.55)	16 (11.45)
	≤20	75 (23.36)	43 (23.89)	32 (22.70)
	21-40	80 (24.92)	32 (17.78)	48 (34.04)
	41-60	30 (9.35)	21 (11.67)	9 (6.38)
	61-80	21 (6.54)	13 (7.22)	8 (5.67)
	≥81	44 (13.70)	16 (8.89)	28 (19.58)
Marital status	Single	130 (40.50)	84 (46.67)	46 (32.62)
	Married	99 (30.84)	53 (29.44)	46 (32.62)
	Divorced/separated	92 (28.66)	43 (23.89)	49 (34.76)

Key: N=sample size, FNPB=Federal Neuro-Psychiatric Hospital, Benin City, UBTH=University of Benin Teaching Hospital, Benin City

Names of antipsychotic drugs found in FNPB were tablet trifluoperazine 5mg (generic), tablet haloperidol (generic), tablet olanzapine (Ozace, Olanza), tablet risperidone (Zepidone, Risdal, Risperdal) while that from UBTH were tablet trifluoperazine 5mg (generic), tablet haloperidol (generic), tablet olanzapine (Ozace), tablet risperidone (Risperdal, Zepidone). The cost for each item was used as found whether brand or generic.

The overall sample in group 1 of Tablet Olanzapine 10mg (branded) versus tablet trifluoperazine 17.81±2.51mg (generic), compared to equivalent of tablet haloperidol 10mg (generic) combined with tablet risperidone 3.5±0.51mg (branded) revealed that respondents on risperidone 3.5±0.51mg had highest total cost per respondent of NGN41939 while haloperidol 10mg had the lowest average total cost of NGN23837. Olanzapine 10mg had the highest average

effect of 26.39 of BPRS reduction while haloperidol 10mg had the lowest average response of 22.47 (Table 2).

Comparison in group 2 of tablet olanzapine 5mg (branded) versus tablet trifluoperazine 10mg (generic), compared to equivalent of tablet haloperidol 5mg (generic) combined with tablet risperidone 2mg (branded) showed that olanzapine 5mg had the highest mean total cost of NGN36547 while the lowest total cost per respondents of NGN22441 were those on trifluoperazine 10mg. Participants on tablet olanzapine 5mg gave the highest mean outcome of 21.54 of reduction in BPRS while tablet haloperidol 5mg gave the lowest value of 18.68. Medications in group 1 with higher doses all through also have better effects and higher respective costs than those in group 2 (Table 2).

Table 2: Total Mean Cost ± SD (NGN) and Mean effect± SD (BPRS) in respondents

GROUP 1									
		N	Mean Drug Cost ± SD	Mean S.E Cost ± SD	Mean Trans Cost ± SD	Loss of Prod. Loss ± SD	of	Mean Total Cost ± SD	Mean Effect ± SD
Tablet	Haloperidol 10mg	41	1531 ± 24	540 ± 55	5894 ± 1450	15872 ± 7250	±	23837 ± 7526	± 22.47 ± 3.61
Tablet	Trifluoperazine 17.81±2.51mg	42	3714 ± 391	410 ± 92	6311 ± 1610	20924 ± 6436	±	31359 ± 7186	± 23.36 ± 2.45
Tablet	Risperidone 3.5±0.51mg	36	29383± 3500	322 ± 100	6020 ± 1130	4214 ± 7110	±	41939 ± 9247	± 24.9 ± 3.73
Tablet	Olanzapine 10mg	41	21281 ± 4670	Nil	6293 ± 1470	8087 ± 5150	±	35661 ± 8421	± 26.39 ± 2.43
GROUP 2									
Therapy Equivalent dose		N	Mean Drug Cost ± SD	Mean S.E Cost ± SD	Mean Trans Cost ± SD	Loss of Prod. Loss ± SD	of	Mean Total Cost ± SD	Mean Effect ± SD
Tablet	Haloperidol 5mg	41	954 ± 24	180 ± 44	5971 ± 930	17332 ± 8510	±	24438 ± 8358	± 18.68 ± 3.37
Tablet	Trifluoperazine 10mg	50	1980 ± 51	231 ± 145	6345 ± 1070	13885 ± 5210	±	22441 ± 5612	± 19.88 ± 3.2
Tablet	Risperidone 2mg	37	15733 ± 1600	162 ± 50	6683 ± 1241	11291 ± 6270	±	33869 ± 8743	± 20.87 ± 2.29
Tablet	Olanzapine 5mg	33	16232 ± 930	Nil	5722 ± 1383	14596 ± 5120	±	36547 ± 8856	± 21.54 ± 3.04

Key: N=sample size, FNPH= Federal Neuro-Psychiatric Hospital, Benin City, UBTH=University of Benin Teaching Hospital, Benin City, N=sample size, SD=standard deviation, S.E= Side effect, Trans=Transportation, Prod=productivity, BRPS=Brief Psychiatric rating scale, NGN=Naira

Cost effectiveness analysis of oral antipsychotics without sensitivity test of drugs in group 1 of trifluoperazine 17.81±2.51mg versus olanzapine 10mg revealed that olanzapine is more cost effective than trifluoperazine if one schizophrenic free in a month is worth more than NGN1419.9 while the comparison of haloperidol 10mg with, risperidone 3.5± 0.51mg showed that risperidone is more cost effective if one patient is schizophrenic free in a month is worth more than NGN7449.3 (Table 3). Table 3 also shows cost effectiveness analysis with 1st scenario sensitivity test of medications in group 1, trifluoperazine 17.81±2.51mg being more cost effective than olanzapine 10mg, (i.e. trifluoperazine is more effective and less expensive) while haloperidol 10mg is more cost effective than risperidone 3.5± 0.51mg, implying that haloperidol is more effective and less expensive than risperidone. The second scenario of sensitivity analysis of group 1 of trifluoperazine 17.81±2.51mg

versus olanzapine 10mg revealed that olanzapine is more cost effective than trifluoperazine only when the savings of making one person free from schizophrenia in a month is worth more than NGN537 while that of haloperidol 10mg versus risperidone 3.5± 0.51mg, risperidone is more cost effective only when the savings of making one person free from schizophrenia-free in a month is worth more than NGN2524.1 (Table 3).

Cost effectiveness analysis of oral antipsychotics without sensitivity analysis of trifluoperazine 10mg versus olanzapine 5mg in group 2 showed that olanzapine is more cost effective than trifluoperazine only when the savings of making one person free from schizophrenia in a month is worth more than NGN8497.6 whereas, the comparison of haloperidol 5mg with risperidone 2mg showed that risperidone is more cost effective only when the savings of making one person free from schizophrenic in a month is worth more than NGN4306.6

Table 3: Cost effectiveness analysis of Oral Antipsychotic Medications using Decision tree Analytical model from Patient's perspective

GROUP 1								
Category	Strategy	N	Mean Total cost (N)	I C	Mean Effect	I E	ICER	C/E
No Sensitivity Analysis								
Abs.dominated	Trifluoperazine 17.81±2.51mg	42	31359		23.36			1342.4
Undominated	Olanzapine 10mg	41	35661	4302	26.39	3.03	1419.9	1351.5
Undominated	Haloperidol 10mg	41	23837		22.47			1060.8
Undominated	Risperidone 3.5±0.51mg	36	41939	18102	24.9	2.43	7449.3	1684.3
Sensitivity TA +10%, AA -10% 1st scenario								
Dominant	Trifluoperazine 17.81±2.51mg	42	31359		25.70			1220.2
Dominated	Olanzapine 10mg	41	35661	4302	23.75	-1.95	-2206	1510.5
Dominant	Haloperidol 10mg	41	23837		24.72			964.3
Dominated	Risperidone 3.5±0.51mg	36	41939	18102	22.41	-2.31	-7836	1871.4
Sensitivity TA -10%, AA +10% 2nd scenario								
Undominated	Olanzapine 10mg	41	35661	4302	29.03	8.01	537.1	1228.4
Undominated	Haloperidol 10mg	41	23837		20.22			1178.8
Undominated	Risperidone 3.5±0.51mg	36	41939	18102	27.33	7.11	2524.1	1531.8

Key: TA= effects of Typical antipsychotics, AA=effects of Atypical antipsychotics, N=sample size, N=sample size, IC= Incremental cost, IE=Incremental effect, ICER= Incremental Cost Effectiveness Ratio, C/E= Cost effective ratio.

First instance of cost effectiveness analysis with sensitivity analysis in group 2 revealed that trifluoperazine 10mg is more cost effective than olanzapine 5mg while haloperidol 5mg is more cost effective than risperidone 2mg. The second scenario of sensitivity analysis of group 2 of trifluoperazine 10mg versus olanzapine 5mg revealed that olanzapine is more cost effective than trifluoperazine only when the savings of making one person free from schizophrenia in a month is worth more than NGN2432.7 while the comparison of haloperidol 5mg versus risperidone 2mg, risperidone is more cost effective only when the saving of one person free from schizophrenia in a month is worth more than NGN1533.3 (Table 4).

The educational status attained by the respondents had impact on the response rate to the antipsychotics with $p=0.0251$ having the highest mean effect \pm SD) as 22.67 ± 3.71 for participants who got post graduate level of education. The influence of income on the treatment of patients with schizophrenia gave $P=0.009$, with lowest response rate of 20.45 ± 3.29 for those that had no personal income while the highest effect of 22.67 ± 3.12 was seen for those that were earning not less than NGN81000 per annum. Being divorced or separated gave the poorest response rate of 20.32 ± 3.91 to treatment on antipsychotic medication having $P>0.0001$ (Table 5)

Table 4: Cost effectiveness analysis of Oral Antipsychotic Medications using Decision tree Analytical model from Patient perspective

GROUP 2								
Category	Strategy	N	Mean Total Cost (N)	IC	Mean Effect	IE	ICER	C/E
No Sensitivity Analysis								
Undominated	Trifluoperazine 10mg	50	22441		19.88			1696.70
Undominated	Olanzapine 5mg	33	36547	14106	21.54	1.66	8497.6	1.696.70
Undominated	Haloperidol 5mg	41	24438		18.68			1308.24
Undominated	Risperidone 2mg	37	33869	9431	20.87	2.19	4306.4	1622.86
Sensitivity, TA +10%, AA -10% (1st scenario)								
Dominant	Trifluoperazine 10mg	50	22441		21.87			1026.11
Dominated	Olanzapine 5mg	33	36547	14106	19.39	-2.48	-5657	1884.84
Dominated	Haloperidol 5mg	41	24438		20.55			1167.26
Dominated	Risperidone 2mg	37	33869	9431	18.78	-1.77	-5328.3	1803.46
Sensitivity; TA -10%, AA +10% (2nd scenario)								
Undominated	Trifluoperazine 10mg	50	22441		17.89			1254.3
Undominated	Olanzapine 5mg	33	36547	14106	23.69	5.80	2432.7	1542.72
Undominated	Haloperidol 5mg	41	24438		16.81			1453.78
Undominated	Risperidone 2mg	37	33869	9431	22.96	6.15	1533.5	1475.13

Key: TA= effects of Typical antipsychotics, AA=effects of Atypical antipsychotics, N=sample size, N=sample size, IC= Incremental cost, IE=Incremental effect, ICER= Incremental Cost Effectiveness Ratio, C/E= Cost effective ratio

Table 5: Effect of Socio-demographics of respondents on response rate of Antipsychotic Medications

Variables	Items	Total (n=321)	Mean effect±SD	Mean diff	Mean diff Sig. Value
Sex	Male	195	20.99±3.69		
	Female	126	21.54±3.92	0.55	P=0.2042
Age (years)	≤20	28	20.94±4.14		
	21-40	159	22.17±4.13	1.23	
	41-60	78	21.82±3.54	0.88	
	≥61	56	21.32±3.21	0.30	P=0.2946
Education	Primary	52	21.01±3.98		
	Secondary	100	22.22±4.21	1.21	
	Post-secondary	113	21.11±3.65	1.10	
	Postgraduate	56	22.67±3.71	1.66	P=0.0251
Monthly Income (NGN)X1000	No personal income	71	20.45±3.29		
	≤20	75	20.87±4.38	0.42	
	21-40	80	21.11±3.69	0.66	
	41-60	30	22.53±2.93	2.08	
	61-80	21	22.23±3.13	1.78	
	≥81	44	22.67±3.12	2.22	P=0.009
Marital status	Single	130	22.27±3.42		
	Married	99	22.06±2.95	-0.21	
	Divorced/separated	92	20.32±3.91	-1.95	P>0.0001

Key: SD=Standard deviation, Sig=Significant, diff=difference, P= P-values

DISCUSSION

There is higher prevalence among males in schizophrenia, this is consonant with findings in other researches^{3,16,17}. Respondents in their most productive age of 21-40 years has higher incidence of schizophrenia compared to other age range and a similar finding was documented in a previous study done in Enugu state, Nigeria^{16,17}.

Respondents who were placed on oral atypical antipsychotics (olanzapine and risperidone) spent more to get medical care but also had better therapeutic outcome compared to oral typical antipsychotics (trifluoperazine and haloperidol). This position is in line with studies done in Canada¹⁸ and Spain¹⁹.

Incremental cost effectiveness analysis of oral antipsychotics revealed that olanzapine 10mg is more cost effective than trifluoperazine 17.81±2.51mg when the amount to make one patient free from schizophrenic symptoms per month is more than the ICER. In the same vein, risperidone 3.5± 0.51mg will be more cost effective than haloperidol 10mg if the amount to make one patient free from schizophrenic symptoms per month is more than the ICER. This may imply that atypical antipsychotics is more cost-effective than typical antipsychotics though previous research are of the view that atypical antipsychotics were more cost effective than typical antipsychotics^{18,19}.

However, incremental cost effectiveness analysis with sensitivity test of oral antipsychotic revealed that it is possible for olanzapine 10mg not to be more cost effective than trifluoperazine 17.81±2.51mg and risperidone 3.5± 0.51mg not to be more cost effective than haloperidol 10mg. The implication of this analysis revealed that typical antipsychotics are not more cost effective than atypical antipsychotics. This stance is supported by a systematic review of eight randomized clinical trials which concluded that there was no clear evidence that atypical antipsychotics enable more cost savings or are more cost effective than typical antipsychotics²⁰ and also by another

systematic study that posited that it was not possible to reach any definite conclusions as to whether the additional costs and benefits represent value for money²¹. Similar pattern of cost effectiveness of oral atypical antipsychotics versus oral typical antipsychotics was seen in incremental cost effectiveness analysis with sensitivity test in group 2 where the first scenario had trifluoperazine 10mg more cost effective than olanzapine 5mg, while haloperidol 5mg was more cost effective than risperidone 2mg.

Respondents with higher level of educational status or higher income had better response rate to antipsychotic medications in schizophrenia in this study and a previous study gave similar results⁷. Those who had unstable relationships, that is separated or divorced showed lower response rate to medications used in managing schizophrenia compared to those who were married, which is in agreement with previous studies^{17,22}.

Limitations of study: the sample size collected in this study were limited to respondents receiving treatment from the outpatient section of the hospitals. In addition, the pharmacoeconomic perspective was assessed only from the patients' viewpoint.

CONCLUSION

Atypical antipsychotics such as olanzapine and risperidone are more expensive but give better outcome compared to typical antipsychotics such as haloperidol and trifluoperazine. These atypical antipsychotics are, however, not more cost-effective therapies than typical antipsychotics when pharmacoeconomic evaluation was done from patient's perspective.

Attainment of higher level of education, having higher income and more stable and satisfactory relationship positively influenced the response rate to antipsychotic medications in the management of schizophrenia.

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