

Traditional eye pencil: A rural-urban comparison of pattern of uptake and association with glaucoma among adults in selected communities of North-Central Nigeria

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ABSTRACT

Background: Ocular diseases of varying etiologies do occur frequently and the use of harmful traditional eye substances worsens the prognosis in terms of visual outcome. **Aim:** To assess the uptake of traditional eye pencil and its association with glaucoma. **Settings and Design:** The study was conducted among adults in rural and urban communities of Ilorin West Local Government Area, North-Central Nigeria. **Materials and Methods:** This was a cross-sectional comparative study. Respondents were selected through Multi-stage sampling technique. Interviewer administered structured questionnaire, clinical report form were used to collect data. Data were analyzed using Statistical Package for Social Sciences. version 15. Level of statistical significance was set at *P* value less than 0.05. **Results:** More of the rural than urban respondents had ever used traditional eye pencil and this was found to be associated with glaucoma within rural ($P=0.029$) and urban areas ($P=0.009$). The prevalence of glaucoma was higher in the rural, 56 (12.4%), compared with the urban area, 37 (8.2%) with a *P* value of 0.037. Age, educational status and religions were the significant predictors of uptake of traditional eye pencil common in both rural and urban areas. **Conclusion:** The high uptake of traditional eye pencil obtained from this study and association with glaucoma calls for urgent awareness/sensitization campaign in the communities. Regular community-based eye screening will be useful in early detection of glaucoma. In addition, government should make eye care services available at the primary health care centers at reduced cost to enhance geographical and financial access.

Keywords: traditional eye pencil, prevalence, risk factors, glaucoma, Nigeria

Introduction

The eye is probably the most amazing and complex structure in the body. The two eyes provide about half the total sensory input from the entire body.^[1] The eye is an external organ and so it is particularly affected by the environment, probably more than any of the other organs in the body. Therefore, poor hygiene as

well as the climate, insect vectors and infection with microorganisms will all significantly affect both the burden and the type of eye disease in the community. Eye diseases are quite common in hot, tropical or developing countries and most of it is either treatable or preventable, but the medical resources for managing

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diseases of the eyes are very inadequate in these countries.^[1]

Among the diseases that affect the eye is glaucoma. Glaucoma is a group of optic neuropathy with characteristic visual field defect in which age above 40 years; race and raised intraocular pressure (IOP) are risk factors. The term glaucoma encompasses a group of ophthalmic diseases that are believed to share the common pathophysiology of elevated intraocular pressure, or abnormal sensitivity to high-normal IOP, resulting in damage to the nerve fiber layer of the retina and irreversible visual loss.^[2] The two most common forms of the disease are primary open angle glaucoma and primary angle closure glaucoma, with variable patterns of disease prevalence in different ethnic groups.^[2]

Ocular diseases of varying etiologies do occur frequently. However, the use of harmful traditional eye medication (TEM) or substances before presentation in the hospital worsens the prognosis in terms of visual outcome. A study conducted in Ado-Ekiti, Nigeria on the prevalence of use of TEM in traumatic eye injury showed that 3.4% of the respondents applied various substances into the eyes after sustaining eye injury. Substances applied include kerosene 25%, cassava water 20.8%, breast milk 12.5%, personal urine 10.8%, and cow urine 8.3%. This was a retrospective review of hospital records which may be faced with incomplete/missing records and may not give an accurate representation of the prevalence of use of TEM. However, this study was cross-sectional comparative with a structured, interviewer-administered questionnaire to elicit responses and likely to give a reliable prevalence.

Also, a prospective study at the University of Benin Teaching Hospital in Nigeria to determine the types, nature and concomitant ocular complication following use of TEM showed that rural dwellers were more likely to use TEM than urban dwellers ($P < 0.0001$). The common traditional medication used were plant extracts (54.9%) followed by concoctions (21.2%) and ocular complications occurred in 54.8% of the patients with no significant difference in the type of medication and ocular complications ($P = 0.956$).^[4]

Despite these reported sequela, the use of traditional eye medications is still a common practice, as most patients in Africa consult a traditional healer before presentation to a hospital in spite of the well-documented toxic effects of TEM.^[5-6] Although, a number of studies have been done on the ocular complications associated with the use of local/traditional eye concoction; however, there is a dearth of specific studies on the effect of the traditional/local eye pencil on the eyes.

Therefore, this study is aimed at assessing the use of traditional eye pencil and its association with glaucoma among adults aged 40 years and above in selected rural and urban communities of Ilorin West Local Government Area in North-central Nigeria.

Materials and Methods

Ilorin West Local Government Area is one of the sixteen LGA that makes up Kwara State of Nigeria. Ilorin West LGA is bounded in the North by Moro LGA, in the South by Asa LGA and in the east by Ilorin East LGA. Ilorin West LGA has a land mass of 54.2 square kilometers and it is located between latitude 8°10' and longitude 4°35'. It is situated in the transitional zone between northern and southern parts of Nigeria.

The Local Government is made up of 12 political wards and a projected population of 441,198. The current total population of adults (40 years and above) in Ilorin West LGA based on projection from 2006 census is 85,424. Ilorin West LGA has four rural communities which are Wara-Oja, Egbejila, Osin and Ogunde communities located in the Wara/Osin/Egbejila ward.

The inhabitants of Ilorin West are indigenous people with strong cultural ties. The community is a confluence of cultures populated by inhabitants that speak different languages which include Yoruba, Fulani, Nupe, Igbo and Hausa. The heterogeneous people that constitute this community could be traced to the historical background of Ilorin emirate.

Certain socio cultural practices that are commonly practiced among the people include facial scarification and use of traditional eye pencil ("*Tiro*" in Yoruba Language). The use of "*Tiro*" is common among the Yorubas in Nigeria where it is used for both cosmetic and therapeutic purposes. In addition, the use of traditional eye medications (TEM) is also a common practice among the people as some inhabitants often consult a traditional healer before presenting to the hospital. This is apart from the practice of self-medication and belief in supernatural forces as the cause of blindness thus preventing early presentation to the hospital. These patronized traditional healers tend to prefer the use of concoctions that cause irritation and pain because this is perceived as being potent. Some of the substances often used may be acidic or alkaline resulting in ocular burns. Worse still, no particular attention is paid to the content, concentration and mode of action as most of these concoctions are made, without recourse to hygiene, using contaminated water, local gin, saliva and even urine. Poverty, poor health seeking behavior, socio-cultural beliefs, and lack of access to specialized

eye care services/health facilities are some of the common reasons for the persistence of this practice among the people of Ilorin West LGA. The increasing worldwide interest in the use of herbal medicines could also be a factor.

Ilorin West LGA has a total of 20 public health facilities. This comprised two cottage hospitals, one General hospital owned by the Kwara State government, where as the remaining 17 owned by the Local Government are a comprehensive health center and 16 primary health centres. There is no specialized eye care service rendered in any of these hospitals, except the General hospital where there is a Consultant Ophthalmologist. Five of these health centres, one in each of the chosen rural and urban communities will be used as fixed post for the ophthalmological examination/screening. However, there are a few health centres located outside the Ilorin West Local Government Area where specialized eye care services can be accessed. These are the Kwara State Specialist Hospital, the Civil service clinic and the University of Ilorin Teaching Hospital.

This was a cross-sectional comparative study. The study populations were adult men and women in the selected/study communities four rural and one urban of Ilorin West LGA. The exclusion criteria used were age 40 years and above with previous history of ocular surgery; visitors to the selected communities; those with red eye or other acute eye infection (e.g. conjunctivitis regardless of the cause) because the dilating agent for fundoscopy may worsen the symptoms; and adults with cornea or media opacity as it makes the fundus inaccessible/invisible.

The minimum sample size for the study was determined using the formula for comparative study when comparing the mean (intra ocular pressure in rural $\mu_{[1]}$ and urban μ_0 communities) of two independent groups. A total sample size of 300 (inclusive of 10% non response) was obtained for each of rural and urban area. However, because of the use of cluster design, a design factor of 1.5 was used to give 450 each for rural and urban area making an overall total of 900.^[7-8]

Multistage sampling technique with four stages was used. Simple random sampling technique by balloting was used to select one urban ward out of the 11 urban wards in Ilorin West LGA. Alanamu ward was selected, however, the only rural ward (Wara/Osin/Egbejila) was used in the study. Therefore, a rural and an urban ward were used for the study.

Simple random sampling technique by balloting was used to choose a community from the three urban

communities (Balogun Alanamu, Adabata and Isale-Aluko) that made up the selected urban ward. Alanamu community was randomly selected as the urban community. However, all the four (Wara-oja, Osin, Egbejila and Ogundele) communities in the only rural ward were used. In all, a total of five communities were used for the study.

Household enumeration was conducted to know the number of households in all the five communities. The households in each community were delineated into enumeration areas. Each enumeration area demarcation has a cluster of 44 households. Alanamu community has a total of 38 enumeration areas; Wara-osin two enumeration areas; Egbejila three enumeration areas; Osin-Aremu four enumeration areas, while whereas Ogundele has 51 has two enumeration areas. A total of 30 enumeration areas were randomly selected from the 38 enumeration areas in the urban community chosen. However, all the 11 enumeration areas in the rural communities were selected.

Cluster sampling technique was used to select the required number of respondents across the chosen enumeration areas. Each enumeration area was regarded as a cluster and all eligible and willing respondents in the households within the selected enumeration areas were recruited for the study until the required sample size of 450 each was attained for both the rural and urban communities. For households within an enumerations area where eligible respondents were not willing to participate or where there were no eligible respondent, the next household was visited to recruit participant.

Four research assistants were trained to participate in the study. The questionnaire was translated into the local language (Yoruba) for easy interpretation and back translated into English language. The intra ocular pressure was measured using the Goldmann standard Perkins (hand-held) applanation tonometre (Haag-Streit[®]), applanation prism, local an a esthetic drops, fluorescein strips and clean cotton wool or gauze swabs. Fundoscopy was done through the use of the ophthalmoscope. The light reflection in the examination room was lowered and respondents who are using glasses were asked to remove them. A multi-letter Snellen chart or E chart (for respondents with no formal education) was used to assess the respondents' visual acuity.^[9]

The questionnaire was pre-tested in Okelele community, another community located in Ilorin East LGA with a view to detect deficiencies or ambiguities in the questionnaire. Ethical approval for the study was

obtained from the research and ethical committee of the University of Ilorin Teaching Hospital. Informed consent was obtained, signed or with a thumb print from the study participants and the nature of the research was explained. Anonymity and confidentiality of results of the respondents was ensured. The respondents with abnormal intra-ocular pressure and or funduscopy results were referred to Consultant Ophthalmologists for further assessment. All the referred respondents were properly tracked to ensure that they received the required treatment.

Data collation and editing was done manually to detect omission and ensure uniform coding. The analysis was done using SPSS version 15; frequency tables and cross tabulations were generated Bivariate and Multivariate analysis involving the use of Chi square, odds ratio with 95% confidence interval and regression was employed to analyze the variables. Chi-square test was used to determine statistical significance of observed differences in the cross tabulated categorical variables. Odds ratio (OR) was calculated to determine the strength of association between categorical variables in 2 x 2 cross-tabulated variables. Logistic regression analysis was used to determine/identify the strong predictors of risk uptake of traditional eye pencil among the respondents.

Diagnostic criteria for Glaucoma

Intra-Ocular Pressure values more than 21mmHg; a difference of 4mmHg or more between the two eyes was considered as abnormal. Low or Normal IOP with visual field defect was regarded as normal tension glaucoma. High IOP with normal disc will be classified as Ocular Hypertension.^[10]

Optic disc status cup-disc ratio more than 0.5. When there is evidence of glaucomatous optic nerve damage, that is, cupping of more than 0.5. However, if there was no such evidence, the participant was classified as non-glaucomatous.^[10]

Visual field. participants with visual field defects suggestive of glaucoma was regarded as having glaucoma if there is either glaucomatous optic disc changes or high IOP.^[10]

Results

As shown in [Table 1], Older respondents (≥ 60 years) were slightly higher in the rural communities, 168 (37.3%), compared with the urban area where in which they made up 157 (34.8%). This observed difference in the age composition between the rural and urban areas was however, not statistically significant ($P=0.361$).

Table 1: Sociodemographic characteristics of the respondents

Variable	Rural N = 450 n (%)	Urban N = 450 n (%)	χ^2	P value
Age (years)				
40–49	185 (41.1)	178 (39.6)	2.0	0.361
50–59	97 (21.6)	115 (25.6)		
≥60	168 (37.3)	157 (34.8)		
Mean	= 53.6 ± 11.7	54.3 ± 11.6	t= - 0.9	0.336
Sex				
Male	133 (29.6)	110 (24.4)	2.9	0.098
Female	317 (70.4)	340 (75.6)		
Marital status				
Married	329 (73.1)	309 (68.7)	3.9	0.418
Widow ed	96 (21.3)	108 (24.0)		
Single	17 (3.8)	20 (4.4)		
Divorced	6 (1.3)	12 (2.7)		
Separated	2 (0.5)	1 (0.2)		
Level of Education				
No formal education	308 (68.4)	176 (39.1)	172.8	0.0001
Primary	61 (13.6)	30 (6.7)		
Secondary	52 (11.6)	46 (10.2)		
Tertiary	29 (6.4)	198 (25.2)		
Tribe				
Yoruba	435 (96.7)	438 (97.3)	6.3	0.043
Hausa/Fulani	12 (2.7)	4 (0.9)		
Igbo	3 (0.6)	8 (1.8)		
Religion				
Islam	430 (95.6)	412 (91.6)	5.9	0.020
Christianity	20 (4.4)	38 (8.4)		
Occupation				
Trading	258 (57.3)	171 (38.0)	195.8	0.0001
Civil servant	47 (10.4)	185 (41.1)		
Artisans/Farming	112 (24.9)	14 (3.1)		
Housewife	4 (0.9)	7 (1.6)		
Unemployed	29 (6.5)	73 (16.2)		
Average Monthly Income(N)				
≤20,000	290 (64.5)	205 (45.6)	40.7	0.0001
21,000–40,000	64 (14.2)	64 (14.2)		
≥41,000	96 (21.3)	181 (40.2)		
Median income-	N15,000	N25,000		

Although While more than three-quarters of the respondents in both rural, 430 (95.6%), and urban, 412 (91.6%), communities were Moslems, Christianity accounted for less than one-tenth of the respondents in each of the rural and urban areas. This observed difference was found to be statistically significant with a P value of 0.020.

[Table 2] showed that respondents who had ever used traditional eye pencil were more in the rural areas compared with the urban area. Comparatively, as shown in [Table 3], there was no difference between the rural and urban communities in the use of traditional

Table 2: Uptake and duration of use of traditional eye pencil

Variable	Rural	Urban	χ^2	P value
	n (%)	n (%)		
Use of Traditional pencil-"Tiro"				
Ever use	351 (78.0)	261 (58.0)	41.4	0.0001
Never use	99 (22.0)	189 (42.0)		
Duration of use (years)	N = 351	N = 261		
[10≤]	114 (32.5)	71 (27.2)	4.1	0.130
11–20	47 (13.4)	27 (10.3)		
[20>]	192 (54.1)	163 (62.5)		

Table 3: Prevalence of glaucoma and association with traditional eye pencil among the respondents

Variable	Rural	Urban	χ^2	df	P value
	n (%)	n (%)			
Glaucoma screening	N = 450	N = 450			
Glaucoma	56 (12.4)	37 (8.2)	4.3	1	0.037
No glaucoma	394 (87.6)	413 (91.8)			
	$\phi = 0.069$	OR = 1.6 (1.0–2.5)*			
Lateralization of Glaucoma	N = 56	N = 37			
Unilateral	40 (71.4)	28 (75.7)	0.2	1	0.831**
Bilateral	16 (28.6)	9 (24.3)			
	OR=0.8 (0.3–2.3)*				
Traditional Eye Pencil-"Tiro"					
Ever use	50 (89.2)	29 (78.4)	2.1	1	0.149
Never use	6 (10.8)	8 (21.6)			

:phi co-efficient;OR: Odds ratio (95%CI);VF: Visual Field; **Yates correction.

eye pencil and its association with glaucoma as more than three-quarters of the rural and urban who had ever used traditional eye pencil were found to have glaucoma. However, within the rural ($P=0.029$) and urban ($P=0.009$) communities, the uptake or use of traditional eye pencil was associated with the development of glaucoma [Table 4]. As seen in [Table 5], respondents with no formal education used traditional eye pencil more than those with formal education in both rural and urban areas and this difference was statistically significant. [Table 6] showed the significant predictors of uptake of traditional eye pencil to be age, educational status and religion.

Discussion

The mean age of the respondents in the urban area (54.3 ± 11.6) was slightly higher than that of the rural area (53.6 ± 11.7), but the difference was however, not significant mainly because the study targeted similar age groups in the two areas. This can also be explained by the increase movement of active population into the urban area in search of jobs and better conditions of living. This movement of the rural population into

Table 4: Traditional eye pencil and glaucoma within the rural and Urban areas

Variable	Rural		Urban	
	Glaucoma		Glaucoma	
	Yes (%)	No (%)	Yes (%)	No (%)
Traditional eye Pencil-"Tiro"				
Ever use	50 (14.3)	301 (85.7)	29 (11.1)	232 (88.9)
Never use	6 (6.0)	93 (94.0)	8 (4.2)	181 (95.8)

[$^2 \chi$] = 4.8; df=1 OR=2.6 (1.1–6.9) $p=0.029$ $\chi^2 = 6.9$; df=1 OR=2.8 (1.2-6.9) $p=0.009$

OR: odds ratio; *Fisher exact.

Table 5: Sociodemographic determinants of use of traditional eye pencil among rural and Urban respondents

Variable	Traditional Eye Pencil		χ^2	df	P value
	Rural N = 351	Urban N = 261			
	Yes (%)	Yes (%)	2.5	1	0.116
Age (years)					
40-59	200 (56.9)	132 (50.6)			
[60≥]	151 (43.1)	129 (49.4)			
Educational status					
No formal education	263 (74.9)	141 (54.0)			
Formal education	88 (25.1)	120 (46.0)	29.2	1	0.0000001
Sex					
Male	88 (25.1)	59 (22.6)	0.5	1	0.480
Female	263 (74.9)	202 (77.4)			
Marital status					
Ever married	340 (96.9)	257 (98.5)	1.6	1	0.205
Not married	11 (3.1)	4 (1.5)			
Religion					
Islam	343 (97.7)	253 (96.9)	0.4	1	0.547
Christianity	8 (2.3)	8 (3.1)			

Table 6: Regression analysis showing the predictors of uptake of traditional eye pencil in both rural and urban area

Variable	β	SE	Exp (β)	P value
Age	-0.023	0.009	0.977	0.011
Sex	-0.156	0.182	0.856	0.391
Educational status	0.574	0.069	1.776	<0.001
Marital status	0.043	0.110	1.044	0.694
Religion	1.420	0.708	4.138	<0.001

the urban areas causes urbanization; a number of the adults/elderly prefer to stay in the urban areas as compared to the previous norm where they do relocate to the village after retirement or attaining a prescribed age. Also, apart from the fact that this study targeted adult men and women, Ilorin west Local Government Area is predominantly an urban Local Government with vast commercial activity involving active/adult population.

In this study, those who are 60 years and above were found to be slightly more in the rural area compared with the urban area. This is to be expected as the erstwhile norm of elderly retiring to the villages to spend the rest of their lives after having worked to earn a living in the urban areas of the society for the most of their lives still subsists to some extent. The elderly tend to have Poor behaviour possibly due to lack of support or care or as a result of lack of financial access. Also, the female respondents in this study were found to be more than the men in both the rural and urban communities, but the difference was not significant ($P=0.098$). Specifically, females accounted for 70.4% and 75.6% of the respondents in both the rural and urban communities respectively. In this part of the society, it is socio-cultural for men to go out and fend for their families, where as the women remain at home to take care of the children; and this study was a household survey with a preventive/screening aspect. More so, women have been found to be involved more in preventive/diagnostic health measures than the men.^[11] These findings were also similar to that of Abdulraheem *et al*^[12] in a study among the elderly in Borno State where the women were more than the men in the rural community studied.^[12]

One of the commonest traditional eye medication TEM ever used by the respondents in this study for ocular complaints was found to be the traditional/local eye pencil ("*Tiro*") While Whereas almost three-quarters, 72.7%, of the rural respondents had ever used the local eye pencil to treat ocular complaints, almost half, 47.1%, of the urban respondents had ever used it. Because "*Tiro*" is a Nigerian traditional eye preparation, this finding was therefore not unexpected as strong cultural roots, tradition and customs are likely going to be more pronounced in the rural than the urban areas.

This study also found that, apart from using the local eye pencil for treatment of ocular complaints, there were those who used it on social basis as eye cosmetics. A total of 351 (78.0%) rural participants compared with 58.0% urban respondents were using it both socially as eye cosmetics and as a remedy for ocular diseases. More of the rural than the urban participants had ever used (be it socially and as a trado medicine/ocular remedy) local eye pencil and the difference was found to be statistically significant ($P=0.0001$). This finding was similar to that obtained by Ukponmwan and Momoh^[4] Ukponwan *et al* in Benin-city, Nigeria, where 95.6% of all new patients seen in the eye clinic were living in urban areas, whereas 54.9% of the participants who used TEM lived in rural areas.^[4] Rural residence was found to be an important factor in the use of TEM

in the study, and there was a statistically significant difference between urban or rural residence and the use of TEM ($P<0.0001$).

In Nigeria, a large proportion of the population resides in rural areas where farming is a major occupation. There are also other outdoor workers such as traders and artisans. These workers are exposed to trauma and a climate that predispose them to ocular conditions such as abrasions, lacerations, allergic, and bacterial conjunctivitis which is compounded by poverty and lack of access to medical care.^[4] These factors predispose to the use of traditional eye remedy. The lack of access to hospitals, due to proximity and relatively access to TEM through friends, relatives, and neighbors likely explains the preponderance of rural participants resorting to TEM.

The use of traditional eye pencil ("*Tiro*"-Antimony Sulphide/Stibnite) is an age-long tradition among the people in the study area. More than three-quarters of the rural and urban respondents who had ever used the traditional eye pencil had glaucoma, but this difference was not significant. However, within the rural and urban areas, this study observed a significant association between the use of traditional eye pencil and glaucoma in the rural ($P=0.029$) and urban ($P=0.009$) areas.

"*Tiro*" is a traditional eye preparation used in Nigeria across diverse cultures (including the Yorubas) for cosmetic purposes and as a medicine for the eyes. It is usually applied to the inner surface of the eyelids. "*Tiro*" contains high concentrations of lead; therefore poisoning is a potential risk associated with its application and use. It is also possible that the lead content of the substance could get absorbed into the eyes, may cause ocular irritation, and possibly trigger glaucomatous changes.

Conclusion

From this study, the use of traditional eye pencil, although an age-long tradition in the study communities, was found to be associated with development of glaucoma. In as much as further studies are needed to establish causality, however, proper health education of the public and traditional healers can go a long way to reducing this practice and control the incidence of ocular diseases particularly glaucoma.

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Conflict of interest

There are no conflicts of interest to declare.

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