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Adherence to antiretroviral drug prophylaxis by HIV-positive mothers and its impact on mother-to-child transmission (MTCT) of HIV infection

Ezeudo Ewuziem Nwaozuzu [1*], Ikechukwu Nosike Dozie [2]

[1]*Pharmacy Department, Federal Medical Centre, Owerri, Imo State, Nigeria*
[2]*Department Of Public Health Technology, Federal University of Technology, Owerri, Imo State, Nigeria*

Abstract

This has sparked fears of possible increase in MTCT of HIV infection because of the high HIV content of breast milk. This study was designed to ascertain the attitude of HIV positive mothers towards ARD prophylaxis and its impact on mother - to - child transmission (MTCT) of HIV infection in Eastern Nigeria. About one hundred and four (104) pregnant HIV positive mothers attending the PMTCT ante-natal clinic were counseled (during their pregnancy through their labor and breastfeeding period)and recruited for the study after obtaining their consent. They were also counseled on the new PMTCT guidelines of exclusive breastfeeding of infants by HIV positive mothers under ARD prophylactic cover for both mothers and infants during pregnancy, at delivery and throughout the duration of breastfeeding. A data collection form was also designed and used to collect and record relevant information/data on the mothers and their infants as well as results. It was found that about 97% of the mothers knew their HIV status before the delivery of their infants while only 3% of them did not know their status before their babies' delivery. About 79% of the mothers took HAART / ARD prophylaxis during pregnancy, delivery and breastfeeding of their infants while 21% of them did not. About 91% of the infants received ARV prophylaxis at delivery and during their breastfeeding period while 9% of them did not. About 77% of the mother-infant pairs took ARV prophylaxis during pregnancy, delivery and breastfeeding while 23% did not. Out of the 104 infants only 6 of them (6%) gave a positive HIV PCR test result while 98 (94%) of them tested negative. The study thus concluded that HIV-positive mothers in Eastern Nigeria and their infants' exhibit good adherence to antiretroviral drug prophylaxis recommendations and this good adherence may be responsible for the low rate of MTCT of HIV infection in southeast Nigeria.

Keywords:Adherence, Antiretroviral drugs, HIV-positive mothers, Mother-to-child transmission (MTCT), HIV/AIDS

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*Corresponding author. *E-mail address:* ezeudoe@yahoo.com

1. Introduction

The WHO recommends exclusive breastfeeding or exclusive formula feeding of infants under antiretroviral prophylactic drug cover for both HIV – positive mothers and their infants as a means of reducing the likelihood of HIV transmission to infants.It is important to note that the ability of this policy to reduce MTCT of HIV infection depends largely on the antiretroviraldrug prophylaxis component. Without the medications HIV viral load will increase predisposing the infants to infection.

Studies have confirmed that HAART for mothers effectively reduces the risk of infant HIV infection while preserving the breastfeeding option for mothers (Kouanda et al., 2010).In another study, prophylactic antiretroviral therapy in mothers and babies gave a marked reduction in mother–to–child transmission (MTCT) rates while feeding with BMS (Breast milk substitute) conferred a superior protection against MTCT than EBF (Ugochukwu and Kanu, 2010).Thus the attitude of HIV – positive mothers toward antiretroviral medications and prophylaxes is very vital for the success of the global PMTCT programs of the WHO.

2. Methods

This is part 2 of 3 presentations from a study carried out using the method described below. The other parts will also be subsequently published in this journal.The study is both prospective and retrospective in nature. Ethical approval for the study was sought for and obtained from the management of the centre where the study was done (Appendix 1). About 104 HIV-positive mothers attending the PMTCT ante-natal clinic at the study centre were individually counseled on the importance of the new PMTCT guidelines of exclusive breastfeeding of the infant under ARV prophylactic cover for both mother and infant during pregnancy, delivery and breastfeeding. They were then recruited into the study after seeking and obtaining informed consent from them to use data collected from them, their medical records and laboratory test results for the study. A copy of the consent form is shown in Appendix 2. A proforma (data collection form – Appendix 3) was also designed and used to collect/ document relevant information from the HIV-positive mothers participating in the study and from their hospital records. Then, the new mother-child pairs were now followed up with ARVs and nutritional support and counseling. At three (3) months of age, dry blood samples (DBS) of the infants were prepared and screened for HIV using the HIV Ribonucleic Acid Polymerase Chain Reaction test (HIV - RNA PCR Test).The data collected were then collated and analyzed.

3. Data analysis

Two methods were used in the analysis of the data, namely:

1) Method of percentage
2) The chi-square

The method of percentage was used to show the extent of relationship among variables. The Chi-square (X^2) was used to determine the probability that differences in the expected and deserved number of cases falling in each cell of the table occurred because of sampling variations (Thirkette, 1976). It is a non-parametric infferential statistical method used in the analysis of frequencies of nominal data (Nnadozie, 1980).

4. Results

The results of the fore-going study are summarized as follows:

- About 54% of the infants involved in the study were males while 48% of them were females.
- About 97% of the mothers knew their HIV status before the delivery of their infants while only 3% of them did not know their status before their babies' delivery.
- About 79% of the mothers took HAART/ARV prophylaxis during pregnancy, delivery and breastfeeding of their infants while 21% of them did not.
- About 91% of the infants received ARV prophylaxis at delivery and during their breastfeeding period while 9% of them did not.
- About 77% of the mother-infant pairs took ARV prophylaxis during pregnancy, delivery and breastfeeding while 23% did not.
- In about 63% of the mother-infant pairs, the infant received ARV prophylaxis while mother did not.
- In about 8% of the mother-infant pairs, the mother took ARV prophylaxis while the infant did not.
- In 29% of the mother-infant pairs, both the mothers and their infants did not take ARV prophylaxis.
- About 94% of the babies had a negative HIV PCR test result while only 6% of had a positive result.
- About 67% of the HIV positive infants were females while only 33% of them were males.
- Only one (1) out of the six (6) mothers (whose babies were HIV PCR positive) took ARV prophylaxis.
- Only two (2) out of the six (6) HIV PCR positive babies took ARV prophylaxis after delivery.

These findings are summarized in the tables on the next pages;

Table 1. Gender distribution of the infants involved in the study

GENDER	NO. OF INFANTS	% OF INFANTS
Male	54	52
Female	50	48
Total	104	100

Table 1 shows that the number male infants involved in the study [54%] was slightly more than the number of females involved in the study [48%].

Table 2. MTCT rates among the mothers in the different infant feeding options

FEEDING OPTION	NO. OF MOTHERS	NO. OF POSITIVE INFANTS	% OF INFANTS WITHIN GROUP
EBF	65	3	5
EFF	24	2	8
MF	15	1	7
TOTAL	104	6	

Table 2 shows that MTCT rates was lowest among the EBF group [5%] followed strangely by the MF group [7%] and the EFF group [8%].

Table 3. Distribution of mothers' use of prophylactic HAART drugs during pregnancy and breastfeeding

USE OF PROPHYLAXIS	NO OF MOTHERS	% OF MOTHERS
Yes	82	79
No	22	21
Total	104	100

Table 3 shows that most of the mothers involved in the study [70%] used prophylactic HAART drugs during their pregnancy and delivery while only 21% of them did not.

Table 4. Distribution of infants' use of prophylactic HAART drugs during breastfeeding

INFANT PROPHYLAXIS	NO OF INFANTS	% OF INFANTS
YES	95	91
NO	9	9
Total	104	100

Table 4 shows that most of the infants involved in the study [91%] received ARV prophylaxis during breast feeding while only 9% of them did not receive prophylaxis during breast feeding.

Table 5. Distribution of mothers who took HAART during pregnancy and after delivery and whose infants received ARV prophylaxis

BOTH MOTHER AND INFANT RECEIVED PROPHYLAXIS	NO OF MOTHERS –INFANT PAIRS	% OF MOTHERS-INFANT PAIRS
Yes	80	77
No	24	23
Total	104	100

Table 5 shows that most of the mother-infant pairs involved in the study [77%] took ARV prophylaxis during pregnancy, after delivery and during breastfeeding. Only 23% of the pairs did not adhere to the ARV prophylaxis recommendation.

Table 6. Distribution of mothers who did not take ARV but whose infants took ARV prophylaxis

MOTHER DID NOT BUT INFANT DID TAKE PROPHYLAXIS	NO OF MOTHERS –INFANTS PAIRS	% OF MOTHERS-INFANT PAIRS
Yes	15	63%
No	9	37
Total	24	100

Table 6 shows that out of the 24 non- adherent pairs, 15 [i.e. 63%] of the pairs involved the mother not taking the ARV prophylaxis whereas their infant took prophylaxis.

Table 7. Distribution of mothers who took ARV prophylaxis but whose infants did not

MOTHER DID BUT INFANT DID NOT TAKE PROPHYLAXIS	NO OF MOTHERS-INFANTS PAIRS	% OF MOTHERS –INFANT PAIRS
Yes	2	8
No	22	92
Total	24	100

Table 7 shows that out of the 24 non - adherent pairs, 2 [8%] of them involved the mother taking ARV prophylaxis whereas the infant did not.

Table 8. Distribution of mothers who did not take ARV prophylaxis and whose infants did not also received ARV prophylaxis

BOTH MOTHER AND INFANT DID NOT TAKE PROPHYLAXIS	NO OF MOTHERS-INFANTS PAIRS	% OF MOTHER –INFANT PAIRS
Yes	7	29%
No	17	71
Total	24	100

Table 8 shows that out of the 24 non- adherent mother-infant pairs, 7 [29%] of them involved both the mother and the infant not taking ARV prophylaxis.

Table 9 shows that only 6% of the infants involved in the study seroconverted to HIV-positive status after 3 months of delivery while 94% remained HIV-negative after the same period.

Table 9. Distribution of the infants' HIV PCR test results after 3 months of delivery

INFANT HIV PCR TEST RESULTS	NO OF INFANTS	% OF INFANTS
Positive result	6	6
Negative result	98	94
Total	104	100

Table 10. Gender distribution of the HIV PCR positive infants

GENDER	NO OF INFANTS	NO OF PCR HIV POSITIVE INFANTS	% OF POSITIVE INFANTS	% OF CORRESPONDING GENDER POPULATION
Male	54	2	33	4
Female	50	4	67	8
Total	194	6	100	

Table 10 shows that most of the infants [67%] that seroconverted to HIV-positive status were females while 33% of them were males.

Table 11. Distribution of mothers' knowledge of their HIV status prior to pregnancy or delivery

KNOWLEDGE OF HIV STATUS	NO OF MOTHERS	% OF MOTHERS
Yes	101	97
No	3	3
Total	104	100

Table 11 shows that most of the mothers involved in the study (97%) knew their HIV status prior to their pregnancies and deliveries while a few of them (3%) did not know their status.

5. Statistical analysis

Here we conduct statistical analysis using the Pearson chi-square method to validate some of the above results that are related to our hypotheses.

Hypothesis 1

HO_1:HIV-positive mothers in Eastern Nigeria and their infants exhibit poor adherence to antiretroviral drug prophylaxis recommendations.

HA_1:HIV-positive mothers in Eastern Nigeria and their infants exhibit good adherence to antiretroviral drug prophylaxis recommendations.

Decision rule

Accept null hypothesis if the value of the chi - square calculated is less than the chi - square table value and reject the alternative hypothesis, otherwise accept the alternative hypothesis if the value of the chi - square calculated is greater than the chi - square table value and reject the null hypothesis. Mathematically, the above decision rule is stated as follows:

Accept H_o if X^2 (Cal) < X^2 (tab)

Accept H_a if X^2 (Cal) > X^2 (tab)

To test this hypothesis we use table 5 above.

BOTH MOTHER AND INFANT RECEIVED PROPHYLAXIS	NO OF MOTHERS –INFANT PAIRS	% OF MOTHERS-INFANT PAIRS
Yes	80	77
No	24	23
Total	104	100

Here the expected frequency (F_e) is 50/50 since the chance probability is half (1/2).As such,

$$X^2 cal = \frac{[F_o - F_e]^2}{F_e} = \frac{(80-50)^2}{50} + \frac{(24-50)^2}{50} = 18 + 13.52 = 31.52$$

Now, degree of freedom (DF) = (R-1) (C-1)

= (2-1) (2-1)

= 1 X 1

= 1

Then from Chi-Square table,

DF 1 at 95% confidence level = 3.84.

i.e. X^2 Cal = 31.52 and

X^2 Tab = 3.84

Therefore based on our decision rule, we reject H_o and accept H_a since X^2 Cal (31.52) is > X^2 Tab (3.84) and conclude that HIV-positive mothers in southeastern Nigeria and their infants exhibit good adherence to antiretroviral drug prophylaxis recommendations.

Hypothesis 2

HO_2: Antiretroviral drug prophylaxis by HIV-positive mothers and their infants results in an increase in the MTCT rates of HIV in Eastern Nigeria.

HA_2: Antiretroviral drug prophylaxis by HIV-positive mothers and their infants does not result in an increase in the MTCT rates of HIV in Eastern Nigeria.

Decision rule

Accept null hypothesis if the value of the chi - square calculated is less than the chi - square table value and reject the alternative hypothesis, otherwise accept the alternative hypothesis if the value of the chi - square calculated is greater than the chi - square table value and reject the null hypothesis. Mathematically, the above decision rule is stated as follows:

Accept H_o if X^2 (Cal) < X^2 (tab)

Accept H_a if X^2 (Cal) > X^2 (tab)

For this hypothesis, we use table 2 for the analysis and adjust the options in the table to give the following table;

FEEDING OPTION	NO. OF MOTHERS	NO. OF POSITIVE INFANTS	% OF INFANTS WITHIN GROUP
EBF	65	3	5
EFF+MF	39	3	15
TOTAL	104	6	

Here the expected frequency (F_e) is 50/50 since the chance probability is half (1/2).As such,

$$X^2\text{cal} = \frac{[F_o - F_e]^2}{F_e} = \frac{(5-50)^2}{50} + \frac{(15-50)^2}{50} = 40.5 + 24.5 = 65$$

Now, degree of freedom (DF) = (R-1) (C-1)

= (2-1) (2-1)

= 1 X 1

= 1

Then from Chi-Square table,

DF 1 at 95% confidence level = 3.84.

i.e. X^2 Cal = 65 and

X^2 Tab = 3.84

Therefore based on our decision rule, we reject H_o and accept H_a since X^2 Cal (65) is > X^2 Tab (3.84) and conclude that antiretroviral drug prophylaxis by HIV-positive mothers and their infants does not result in an increase in the MTCT rates of HIV in southeastern Nigeria.

6. Discussion

The results of the fore-going study shows a near equal number of male infants and females infants delivered by the HIV positive mothers involved in the study. This result further underscores the already known ratio (near equal ratio) of male to female HIV patients.

However, the low incidence of HIV transmission to the infants under study could have been caused by the high level of prophylaxis among the mothers and the infants in the study, as about 79% of mothers and 91% of the infants involved in the study took appropriate and timely ARV prophylaxis.

Again the fact that 97% of the mothers in the study knew their HIV status during or prior to their pregnancies could also have contributed to the low HIV transmission rates as these mothers could have taken precautions to protect their babies from HIV infection.

Analyzing the mother-infant pairs, the results show that in 77% of the mother-infant pairs, both mothers and infants took ARV prophylaxis while in only 23% of the pairs either one or both of the mothers or infants did not take the ARV prophylaxis. This could also have reduced the HIV transmission rates to the infants. A further analysis of the ARV prophylaxis habits among the pairs also reveal that in about 63% of the pairs, the infants received ARV prophylaxis while the mothers did not, in about 8% of the pairs, the mothers took ARV prophylaxis but the infants did not while in 29% of the pairs both the mothers and the infants did not take ARV prophylaxis.

An analysis of the HIV PCR test results reveal a very low incidence of HIV transmission to the infants involved in the study as only 6% of them tested positive while 94% of them tested negative. A further analysis of the HIV PCR positive results show that 67% of HIV PCR positive infants were females while 33% of them were males.

The analysis also show that only one (1) of the six (6) mothers whose infants tested positive took ARV prophylaxis and these are additional factors that could have contributed to the infection of the infants.In addition to the above findings, a general assessment of the adherence of the mother–infant pairs to PMTCT guidelines of exclusive breastfeeding of infants under ARV prophylactic cover for both mothers and infants during pregnancy, delivery and breastfeeding, shows that only 54% of the mother-infant pairs adhered to the guidelines while 46% of the pairs did not adhere to PMTCT guidelines. This degree of adherence is low and could predispose infants to HIV infection from their mothers. This is underscored by the fact that the

adhering mother-infant pairs (54%) group accounted for only one (1) out of the six (6) HIV PCR positive infants while the remaining five (5) HIV PCR positive infants came from the non-adhering (46%) group.

7. Conclusion

Based on the foregoing study and analysis we conclude that HIV-positive mothers in southeastern Nigeria and their infants' exhibit good adherence to antiretroviral drug prophylaxis recommendations and this good adherence may be responsible for the low rate of MTCT of HIV infection in southeast Nigeria.

8. Recommendations

Based on the results of the fore-going study we recommend that:

1. All countries and states of the world as well as their health agencies and institutions and their medical practitioners should adopt and implement the use of antiretroviral drug prophylaxis for both the mothers and infants during pregnancy, at delivery and throughout the period of breastfeeding / formula feeding of the infant.
2. All HIV positivemothers and their relatives should be educated on the benefits of antiretroviral drug prophylaxis and encouraged to practice it especially as it reduces rather than increase the likelihood MTCT of HIV infection.
3. Government and other responsible agencies and organizations should step up efforts at providing ARV's, antibiotics and other medicines and logistics needed to ensure the global success of the PMTCT and other HIV/AIDS related programs of the WHO and their related /affiliated organizations

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Appendices

Appendix 1. Ethical approval for the study

FEDERAL MEDICAL CENTRE

P. M. B. 1010,Orlu Road Owerri, Imo State, Nigeria

Medical Director/CEO
Dr. A. C. Uwakwem
MBBS, FWACS, FICS, FICA, IMAAO
Chief Consultant Ophthalmologist

Head of Clinical Services
Dr. E. C. Osuagwu
MBBS, FWACS
Chief Consultant (Obstetrics & Gynaecology)

Chairman of Board
Prof. Ivara Ejemot Esu, OFR
B.Sc. (Ife) M.Sc (Minnesota) PhD (ABU)
Fellow, Soil Science Society of Nigeria

Head of Administration Services
Mrs. Nnenna Onyegbula
B.Sc. MPA, AHAN

00631

e-mail: fmcowerri@yahoo.com
Phone:08191365555, 08033411575 (MD), 08033362578 (HAS), 08035531242 (HCS)

FMC/OW/P/910/pg209A

19th October 2012

Pharm. Nwaozuzu Ezeudo E.
Pharmacy Department
Federal Medical Centre
Owerri

U.f.s:

Head of Pharmacy Department

Dear Pharm. Nwaozuzu,

APPLICATION FOR APPROVAL TO CONDUCT RESEARCH
RE: BREAST FEEDING AMONG HIV-POSITIVE MOTHERS AND ITS IMPACT ON MOTHER-TO- CHILD (MTC) TRANSMISSION OF HIV INFECTION.

Your application for approval for the conduct of your research project titled as stated above and dated 14th September, 2012 refers.

I am directed to convey approval for you to conduct the study.

It is hoped that you would abide by the methodology detailed in your research proposal.

Dr E. C. Osuagwu
HEAD OF CLINICAL SERVICES
For MEDICAL DIRECTOR

DEDICATED TO CARE & SERVICE

Appendix 2. Consent form for study participants

I,……..of……hereby consent to this study; I acknowledge that I have been fully counseled on the purpose and benefits of the study. I also acknowledge that I have been informed on the confidentiality of any information given by me.

I understand that the study is to be carried out solely for that purpose on the understanding that I shall be entitled to withdrawal of my consent ant time.

Date……..Signed……

(Patient)

I confirm that I explained to the patient the purpose and nature of the study and the fact that refusal to participate will not in any way affect his/her normal care by me or any member of this institution. I know the consequences of any false declaration on this or any other form.

Date……..Signed……..

(Pharmacist/Research).

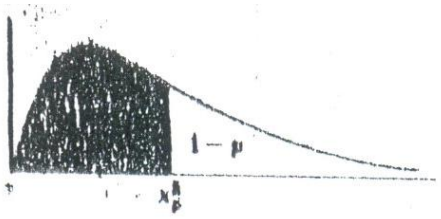
Appendix 3. Study proforma (data collection form)

S/N	Patient Name	Folder No	Patient Address	Patient Phone No	Patient email	Patient ART Regime	Patient CD4 count at delivery	Feeding option			Patient no of deliveries	Infant sex	Infant Prophylactic Regim-en	Infant HIV status at ff Week				
								EBF	EFF	MF				0	14	28	84	168

Appendix C. Chi – square distribution table

APPENDIX C

Percentile Values (χ^2_p) for the Chi-Square Distribution with ν Degrees of Freedom



ν	$\chi^2_{.005}$	$\chi^2_{.01}$	$\chi^2_{.025}$	$\chi^2_{.05}$	$\chi^2_{.10}$	$\chi^2_{.25}$	$\chi^2_{.50}$	$\chi^2_{.75}$	$\chi^2_{.90}$	$\chi^2_{.95}$	$\chi^2_{.975}$	$\chi^2_{.99}$	$\chi^2_{.995}$	$\chi^2_{.999}$
1	.0000	.0002	.0010	.0039	.0158	.102	.455	1.32	2.71	3.84	5.02	6.63	7.88	10.8
2	.0100	.0201	.0506	.103	.211	.575	1.39	2.77	4.61	5.99	7.38	9.21	10.6	13.8
3	.0717	.115	.216	.352	.584	1.21	2.37	4.11	6.25	7.81	9.35	11.3	12.8	16.3
4	.207	.297	.484	.711	1.06	1.92	3.36	5.39	7.78	9.49	11.1	13.3	14.9	18.5
5	.412	.554	.831	1.15	1.61	2.67	4.35	6.63	9.24	11.1	12.8	15.1	16.7	20.5
6	.676	.872	1.24	1.64	2.20	3.45	5.35	7.84	10.6	12.6	14.4	16.8	18.5	22.5
7	.989	1.24	1.69	2.17	2.83	4.25	6.35	9.04	12.0	14.1	16.0	18.5	20.3	24.3
8	1.34	1.65	2.18	2.73	3.49	5.07	7.34	10.2	13.4	15.5	17.5	20.1	22.0	26.1
9	1.73	2.09	2.70	3.33	4.17	5.90	8.34	11.4	14.7	16.9	19.0	21.7	23.6	27.9
10	2.16	2.56	3.25	3.94	4.87	6.74	9.34	12.5	16.0	18.3	20.5	23.2	25.2	29.6
11	2.60	3.05	3.82	4.57	5.58	7.58	10.3	13.7	17.3	19.7	21.9	24.7	26.8	31.3
12	3.07	3.57	4.40	5.23	6.30	8.44	11.3	14.8	18.5	21.0	23.3	26.2	28.3	32.9
13	3.57	4.11	5.01	5.89	7.04	9.30	12.3	16.0	19.8	22.4	24.7	27.7	29.8	34.5
14	4.07	4.66	5.63	6.57	7.79	10.2	13.3	17.1	21.1	23.7	26.1	29.1	31.3	36.1
15	4.60	5.23	6.26	7.26	8.55	11.0	14.3	18.2	22.3	25.0	27.5	30.6	32.8	37.7
16	5.14	5.81	6.91	7.96	9.31	11.9	15.3	19.4	23.5	26.3	28.8	32.0	34.3	39.3
17	5.70	6.41	7.56	8.67	10.1	12.8	16.3	20.5	24.8	27.6	30.2	33.4	35.7	40.8
18	6.26	7.01	8.23	9.39	10.9	13.7	17.3	21.6	26.0	28.9	31.5	34.8	37.2	42.3
19	6.84	7.63	8.91	10.1	11.7	14.6	18.3	22.7	27.2	30.1	32.9	36.2	38.6	43.8
20	7.43	8.26	9.59	10.9	12.4	15.5	19.3	23.8	28.4	31.4	34.2	37.6	40.0	45.3
21	8.03	8.90	10.3	11.6	13.2	16.3	20.3	24.9	29.6	32.7	35.5	38.9	41.4	46.8
22	8.64	9.54	11.0	12.3	14.0	17.2	21.3	26.0	30.8	33.9	36.8	40.3	42.8	48.3
23	9.26	10.2	11.7	13.1	14.8	18.1	22.3	27.1	32.0	35.2	38.1	41.6	44.2	49.7
24	9.89	10.9	12.4	13.8	15.7	19.0	23.3	28.2	33.2	36.4	39.4	43.0	45.6	51.2
25	10.5	11.5	13.1	14.6	16.5	19.9	24.3	29.3	34.4	37.7	40.6	44.3	46.9	52.6
26	11.2	12.2	13.8	15.4	17.3	20.8	25.3	30.4	35.6	38.9	41.9	45.6	48.3	54.1
27	11.8	12.9	14.6	16.2	18.1	21.7	26.3	31.5	36.7	40.1	43.2	47.0	49.6	55.5
28	12.5	13.6	15.3	16.9	18.9	22.7	27.3	32.6	37.9	41.3	44.5	48.3	51.0	56.9
29	13.1	14.3	16.0	17.7	19.8	23.6	28.3	33.7	39.1	42.6	45.7	49.6	52.3	58.3
30	13.8	15.0	16.8	18.5	20.6	24.5	29.3	34.8	40.3	43.8	47.0	50.9	53.7	59.7
40	20.7	22.2	24.4	26.5	29.1	33.7	39.3	45.6	51.8	55.8	59.3	63.7	66.8	73.4
50	28.0	29.7	32.4	34.8	37.7	42.9	49.3	56.3	63.2	67.5	71.4	76.2	79.5	86.7
60	35.5	37.5	40.5	43.2	46.5	52.3	59.3	67.0	74.4	79.1	83.3	88.4	92.0	99.6
70	43.3	45.4	48.8	51.7	55.3	61.7	69.3	77.6	85.5	90.5	95.0	100	104	112
80	51.2	53.5	57.2	60.4	64.3	71.1	79.3	88.1	96.6	102	107	113	116	125
90	59.2	61.8	65.6	69.1	73.3	80.6	89.3	98.6	108	113	118	124	128	137
100	67.3	70.1	74.2	77.9	82.4	90.1	99.3	109	118	124	130	136	140	149

Source: E. S. Pearson and H. O. Hartley, *Biometrika Tables for Statisticians*, Vol. 1 (1966), Table 8, pages 137 and 138.