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*****;
* Project          : ZRHM-REXA-07-JP
*
* Program name     : t1502042002_ZRHM_REXA_07_V1.sas
*
* Author          : L. Yan
*
* Date created     : 05/20/2015
*
* Purpose         : Table T1502042002
*
* Revision History :
*
* Date          Author      Ref      Revision (Date in YYYYMMDD format)
*
*****;

%let prgname=T1502042002_ZRHM_REXA_07_JP_V1;
options mprint;

options sasautos=("W:\pmp07\macros" sasautos) notes;
%init(delivery=9);

%titlecsv(prgname=&prgname., version=5);

%put &title1;
%put &title2;
%put &APPENDIX;
%put &endpoint;
%put &outname.;
%put &fprgname;

options missing="";

%macro outtt;

/* Anti-log transformation to obtain the ratio of Geometric Means
(point estimate) and its confidence interval (lower and upper
bounds); */

    Estimate = 100*exp(Estimate); /* Ratio of geometric mean */

    LowerCL  = 100*exp(LowerCL); /* 95% CI lower bound */

    UpperCL  = 100*exp(UpperCL); /* 95% CI upper bound */

/* Get 1-sided p-value (for THS vs CC)*/

    if (Estimate < 100) then Probt1=Probt/2;

    else Probt1=1-Probt/2;

/* Get Geomteric CV */

CVperc=100*sqrt(exp(RootMSE**2)-1);

/* *****

For analysis of CO breath test and other risk markers analyzed on
the linear scale, simply skip al the log/antilog approach and
change the model statement above with:*/

    model aval = base sex UCPDGR1 trtp;

/*For the p-value, the 1-sided of THS vs CC would be calculated
as*/

    if (Estimate < 0) then Probt1=Probt/2;

    else Probt1=1-Probt/2;

%mend;

%macro cal_summary_pvalue(wher=, outnum=, var=, in=, pflg=, used=, paramcd=, avisit=);
title2 h=10pt j=1 "&used";

proc sort data=&in. out=anadt_&outnum.;
by usubjid;
where &wher. ;

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run;

proc sort data=anadt_&outnum.;
by trtcd;
run;

proc means data = anadt_&outnum. noprint;
by trtcd;
var &var.;
output out=xlab_&outnum. n=n mean=mean median=med std=sd min=min max=max q1=q1 q3=q3 lclm=lclm uclm=uclm;
run;

data xlab_&outnum.;
set xlab_&outnum.;
n1 = trim(left(compress(put(n, 8.))));
if sd > . then mean1 = (trim(left(compress(put(mean, 8.1))))||' ( '||trim(left(compress(put(ceil(sd*100)/100, 8.2))))
)||');
else mean1 = (trim(left(compress(put(mean, 8.1))))||' (NA)';
ci1=trim(left(compress(put(floor(lclm*100)/100, 8.2))))||', '||trim(left(compress(put(ceil(uclm*100)/100, 8.2)))));
median1 = trim(left(compress(put(med, 8.1))));
q1q3 = trim(left(compress(put(q1, 8.2))))||', '||trim(left(compress(put(q3, 8.2))));
min1 = trim(left(compress(put(min, 8.))))||', '||trim(left(compress(put(max, 8.0))));
run;

/*
proc mixed data=anadt_&outnum.;

Class trtcd sex UCPDGR1;

Model logaval = logbase sex UCPDGR1 trtcd / outp=pred;

lsmeans trtcd / pdiff =control('mCC') alpha=0.05 cl;

ods output lsmeans=lsmeans_&outnum. (keep=trtcd lower upper estimate); *each arm;

ods output diffs=LSMeanDiffCL&outnum. (keep=trtcd lower upper probt estimate); * lsmean and C.I. for ratios;

ods output covparms=ROOTMSE&outnum.(rename=(estimate=mse)); *MSE;

run;
*/

title3 h=10pt j=1 "Paramcd: &paramcd, &avisit. Model: MIXED, Method: Log";

proc mixed data=anadt_&outnum.;
class trtp sex UCPDGR1;
model logaval = logbase sex UCPDGR1 trtp / outp=pred;
lsmeans trtp / pdiff =control('mCC') alpha=0.05 cl;
*lsmeans trtp / pdiff =control('SA') alpha=0.05 cl;
ods output lsmeans=lsmeans_&outnum. (keep=trtp lower upper estimate); *each arm;
ods output diffs=LSMeanDiffCL&outnum. (keep=_trtp trtp lower upper probt estimate where=(TRTP="THSm2.2")); * lsmean and
C.I. for ratios;
ods output covparms=estimate&outnum.(rename=(estimate=rootmse)); *MSE;
run;
ods output close;

data pval&outnum.;
set LSMeanDiffCL&outnum.;
ProbtDiff=probt;
keep trtp ProbtDiff;
run;

data lsmeans_&outnum.;
set lsmeans_&outnum.;
lowercl=lower;
uppercl=upper;
lsmean=estimate;
keep trtp lowercl uppercl lsmean;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
lowercl=lower;
uppercl=upper;
difference=estimate;
keep trtp _trtp lowercl uppercl difference;
run;

data lsmeans_&outnum.;
set lsmeans_&outnum.;
if TRTP="THSm2.2" then trtcd=1;
else if TRTP="mCC" then trtcd=2;
else if TRTP="SA" then trtcd=3;

Estimate1 = exp(lsmean); /* Ratio of geometric mean */

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LowerCL = exp(lowercl); /* 95% CI lower bound */
UpperCL = exp(uppercl); /* 95% CI upper bound */
run;

data ROOTMSE&outnum.;
set estimate&outnum.;
*CVperc=100*sqrt(exp(rootmse**2)-1);
cvperc=100*sqrt(exp(rootmse)-1);
run;

proc sort data=lsmeans_&outnum. nodupkey;
by trtcd;
run;

data lsmeans_&outnum.;
length geomean geoci $100;
set lsmeans_&outnum.;
geomean=strip(put(ESTIMATE1, 8.2));
geoci=strip(put(floor(LowerCL*100)/100, 8.2)||", "||strip(put(ceil(UpperCL*100)/100, 8.2)));
keep trtcd geomean geoci;
run;

proc sort data=LSMeanDiffCL&outnum. nodup;
by TRTP _TRTP;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
myord=1;
run;

data ROOTMSE&outnum.;
set ROOTMSE&outnum.;
myord=1;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. ROOTMSE&outnum.;
by myord;
run;

data LSMeanDiffCL&outnum.;
length geomean geoci $100;
set LSMeanDiffCL&outnum.;
if _TRTP eq "mCC" then trtcd=3;
if _TRTP eq "SA" then trtcd=5;

difference = 100*exp(difference); /* Ratio of geometric mean */
lowercl = 100*exp(lowercl); /* 95% CI lower bound */
uppercl = 100*exp(uppercl); /* 95% CI upper bound */

geomean=strip(put(difference, 8.2))||" ("||strip(put(ceil(CVperc*100)/100, 8.2)) ||")";
geoci=strip(put(floor(lowercl*100)/100, 8.2))||", "||strip(put(ceil(uppercl*100)/100, 8.2)));
keep trtcd geomean geoci;
run;

data pval&outnum.;
set pval&outnum.;
if _n_=1;
trtcd=3;
keep trtcd ProbtDiff;
format ProbtDiff PVALUE6.3;
run;

proc sort data=LSMeanDiffCL&outnum.;
by trtcd;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. pval&outnum.;
by trtcd;
run;

data mrep_&outnum.;
set lsmeans_&outnum. LSMeanDiffCL&outnum.;
run;

proc sort data=mrep_&outnum.;
by trtcd;
run;

proc sort data=xlab_&outnum.;
by trtcd;
run;

data xlab_&outnum.;
merge xlab_&outnum.(in=a) mrep_&outnum.;

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by trtcd;
run;

data xlab_&outnum.;
set xlab_&outnum.;
if geoci ne "";
run;

proc transpose data = xlab_&outnum. out=xlab_1_&outnum.;
  id trtcd;
  var n1 geomean geoci;
run;

data rep_&outnum.;
length _name_ _1 _2 _3 ord1 $100;
set xlab_1_&outnum.;
ord1="&outnum";
ordnum=input(ord1, best.);
if upcase(_name_)="N1" then do; _name_="n"; sord=0; end;
if upcase(_name_)="GEOMEAN" then do; _name_="Geometric LS Mean (CV%)"; sord=1; end;
if upcase(_name_)="GEOCI" then do; _name_="95% CI"; sord=2; end;

if upcase(_name_)="MEAN1" then do; _name_="Mean (SD)"; sord=3; end;
if upcase(_name_)="CI1" then do; _name_="95% CI"; sord=4; end;
if upcase(_name_)="MEDIAN1" then do; _name_="Median"; sord=5; end;
if upcase(_name_)="Q1Q3" then do; _name_="Q25, Q75"; sord=6; end;
if upcase(_name_)="MIN1" then do; _name_="Min, Max"; sord=7; end;
if upcase(_name_)="PROBTDIFF" then do; _name_="p-value (one-sided)"; sord=9; end;
run;

data rep;
set rep rep_&outnum.;
run;

%mend;

%macro mainloop(flg=, outn=);

proc sort data=adam.adsl out=trt;
by usubjid;
where &flg.="Y";
run;

data trt;
set trt;
if TRT01A="THSm2.2" then trtcd=1;
else if TRT01A="mCC" then trtcd=2;
else if TRT01A="SA" then trtcd=3;
run;

data anldata1;
set adam.adpc;
if avisitn<=105 then used="The where clause used on the dataset adam.adpc: ANL01FL=Y and ANL02FL=Y and &flg. =Y";
else used="The where clause used on the dataset adam.adpc: ANL01FL=Y and &flg. =Y";

if PARAMCD in ("COT", "NIC") and AVISITn>=101 and TRTP in ("mCC" "THSm2.2") and aval>. and &flg.="Y" and ((101<=avisitn
<=105 and anl02fl="Y") or avisitn in (130, 160, 190)) and anl01fl="Y";
run;

data anldata1;
set anldata1;
*if avisitn=105 and not (anl01fl="Y" and anl02fl="Y") then delete;
*if avisitn=106 then delete;

if aval>0 then logaval=log(aval);
if base>0 then logbase=log(base);
run;

proc sort data=anldata1 out=check(keep=paramn avisitn avisit used paramcd) nodupkey;
by paramn avisitn avisit;
run;

data trt_1;
set trt;
run;

data anldata1;
set anldata1;
if trtp="THSm2.2" then trtcd=1;
else if trtp="mCC" then trtcd=2;
else if trtp="SA" then trtcd=3;

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run;

data check;
set check;
ord=_n_;
run;

%*cal_summary_pvalue(where=1, outnum=1, var=aval, in=anldata1, pflg=1);

data rep;
run;

data _null_;
set check;
call execute ('%cal_summary_pvalue(where=%str(avisitn=||avisitn||' and paramn=||paramn||' ), outnum=||ord||', var
=logaval, in=anldata1, used=||used||', paramcd=||paramcd||', avisit=||avisit||');');
run;

data frep;
set rep;
ord=ORDNUM;
run;

data frep;
merge frep(in=a) check;
by ord;
if a;
if avisitn>.;
run;

proc sort data=trt_1 nodupkey;
by trtcd usubjid;
run;

proc freq data = trt_1 noprint;
tables trtcd/ out= denom;
run;

data _null_;
set denom end=eof;

retain total 0;

total = total+count;

if trtcd= 1 then do;
call symput('trt1', trim(left(put(count,8)))));
end;
if trtcd= 2 then do;
call symput('trt2', trim(left(put(count,8)))));
end;
if trtcd= 3 then do;
call symput('trt3', trim(left(put(count,8)))));
end;

run;

%put trt1=&trt1 trt2=&trt2 trt3=&trt3;

%macro cal_part_main();

data frep;
set frep;

%do i = 1 %to 100;
if (&i-1)*4<ordnum<=&i*4 then pagen=&i;
%end;

run;

%mend;

%cal_part_main();

data frep&outn.;
set frep;
space=" ";
run;

%mend;

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%trtrtfg(pgmname=&loutname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));

title1 bold j=1 "&title1 &title2";

%mainloop(flg=FASFL, outn=1);

ods listing;
ods rtf close;

proc sort data=anldata1 out=fmt(keep=paramn param) nodupkey;
by paramn param;
run;

data fmt;
set fmt;
fmtname="grp";
start=paramn;
label="Parameter: "||strip(param);
run;

proc format cntlin=fmt;
run;

data odata.&prgname.;
set frep1 (in=a);
if a then group="FASFL";
run;

data frep1;
set frep1;
if paramn=1 and avisitn<=105 then pagen=1;
else if paramn=1 and avisitn>105 then pagen=2;
else if paramn=2 and avisitn<=105 then pagen=3;
else if paramn=2 and avisitn>105 then pagen=4;
run;

proc sort data=frep1;
by pagen;
run;

%global totalpage;

data _null_;
set frep1 end=eof;

if eof then do;
call symput('totalpage', trim(left(put(pagen,8)))));
end;

run;

%put totalpage=&totalpage;

%*title(prgname1=&prgname.);

%trtrtfg(pgmname=&outname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));

%macro reppart;

%do i = 1 %to &totalpage;
/*****
title1 bold j=1 "&title1 &title2";

footnote1 bold h=12pt "_____";
footnote2 h=9pt j=1 "Note: mCC = Menthol conventional cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating Sy
stem 2.2 Menthol .";
footnote3 h=9pt j=1 "Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs) from an ANCOVA mo
del conducted on log-transformed";
footnote4 h=9pt j=1 "values with log-transformed baseline value, study arm, sex and mCC consumption reported at screeni
ng as fixed effect factors. ";
footnote5 h=9pt j=1 "Geometrical CV% of the ratio is estimated from the residual mean squares.";
footnote6 h=9pt j=1 " ";
footnote7 h=9pt j=1 "&APPENDIX.";
footnote8 h=9pt j=1 "Study ID:ZRHM-REXA-07-JP Program: &prgname..sas Status: &repversion./&fdate.
Page: &i. of &totalpage";
/*****/

proc report data=frep1 headskip headline spacing=4 nowd split='~' style=[outputwidth=100%] style(header column)=[protec
tspecialchars=off];
column pagen paramn avisitn avisit sord _name _1 space _2 space _3;
where pagen =&i.;
define pagen /order order=internal noprint;

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define paramn /order order=internal noprint;
define avisitn /order order=internal noprint;
define avisit /order "Time point" flow style(column)=[cellwidth=10% just=l];
define sord /order order=internal noprint;

define _name_ /display "Statistic" flow style(column)=[cellwidth=15% just=l];
define _1 /display "THSm2.2" flow style(column)=[cellwidth=10% just=c];
define space /display " " flow style(column)=[cellwidth=0.5% just=c];

define _2 /display "mCC" flow style(column)=[cellwidth=10% just=c];
define space /display " " flow style(column)=[cellwidth=0.5% just=c];

define _3 /display "THSm2.2 : mCC Ratio (%)" flow style(column)=[cellwidth=10% just=c];

COMPUTE after avisitn ;
LINE @1 "";
ENDCOMP;

compute before pagen;
line @1 "";
endcomp;

compute before _page_ /style=[fontweight=bold fontsize=3.75];
line @1 "&title1 &title2";
line @1 " ";
LINE @1 paramn grp.;
line @1 "R/RTF'\brdrb\brdrs\brdrw30\brsp20\b ' ' ";
endcomp;

compute after _page_/style=[fontsize=1.75];
line @1 "Note: mCC = Menthol conventional cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating System 2.2 Menthol.";
line @1 "Note: Adjusted geometric least squares (LS) means and confidence intervals (CIs) from an mixed model conducted on log-transformed";
line @1 "values with log-transformed baseline value, study arm, sex and mCC consumption reported at screening as fixed effect factors. ";
line @1 "Geometrical CV% of the ratio is estimated from the residual mean squares.";
line @1 " ";
line @1 "&APPENDIX.";
line @1 "Study ID:ZRHM-REXA-07-JP Program: &fprgname..sas Status: &repversion./&fdate. Page: &i. of &totalpage";
endcomp;

run;

%end;

%mend;

%reppart;

ods listing;
ods rtf close;

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