Table S1: Daily Food intake of rats normalized to body weight (g/100 g Body weight)

Group	Rat 1	Rat 2	Rat 3	Rat 4	Mean ± SEM (g/100 g BW)
Normal (control)	11.33	10.10	11.00	11.50	10.98 ± 0.31
Scopolamine-induced rats	11.00	10.82	10.84	10.50	10.79 ± 0.10
SID + Donepezil (5 mg/kg)	11.39	11.00	11.00	11.44	11.21 ± 0.12
SID+ 4% AFM inclusion diet	10.66	11.33	11.50	11.06	11.14 ± 0.18
SID+ 8% AFM inclusion diet	11.50	11.22	11.50	10.71	11.23 ± 0.19
SID+ 4% AFD inclusion diet	11.06	11.50	11.00	11.44	11.25 ± 0.13
SID+ 4% AFD inclusion diet	10.20	11.50	11.62	11.88	11.30 ± 0.37

Results are expressed in (Mean ± SD) for each rat (n= 4 rats per group). No significant differences were observed among groups ($p > 0.05$), confirming consistent consumption of supplemented diets.

KEYS: BW= Body weight AFM= *Aframomum melegueta* AFD= *Aframomum danielli*

Table S2: Detailed Sperm quality Assessment table.

GROUPS	PROGRESSIVE ASSESSMENT (%)			MORPHOLOGY (%)			
	Fast	Slow	Non - motile	N	HD	ND	TD
Normal (control)	62.50±12.52	17.50±7.50	20.00±5.00	67.50±2.53	10.00±0.04	10.00±0.04	12.50±2.50
Scopolamine-induced rats	15.00±4.95*	32.50±6.99	52.50±12.50	37.50±2.50*	20.00±0.03	22.50±2.50	20.00±0.01
SID + Donepezil (5 mg/kg)	45.00±5.01	22.50±7.49	32.50±12.50	60.04±0.02	12.50±2.50	12.50±2.50	15.00±0.04
SID+ 4% AFM inclusion diet	35.00±10.04	37.50±2.50	27.50±7.50	67.50±2.50&	10.00±0.04	12.50±2.50	10.00±5.00
SID+ 8% AFM inclusion diet	62.50±2.47&	27.50±2.49	10.00±0.04	70.00±0.04&	10.02±0.04	12.50±2.50	07.50±2.51
SID+ 4% AFD inclusion diet	45.00±10.04	20.00±5.00	35.00±5.02	65.0±10.03&	05.00±0.03	20.00±10.00	10.00±0.04
SID+ 8% AFD inclusion diet	60.00±4.95&	20.00±5.00	20.00 ±5.00	67.50±7.51&	07.50±2.51	10.04±0.02	15.00±5.00

Results are expressed in (Mean ± SD).

*Values are significantly ($P< 0.05$) different compared with normal (control) group;

& Values are significantly ($P< 0.05$) different compared with Scopolamine-induced rats.

KEYS: N = Normal; HD = Head defect; ND = Neck defect; TD = Tail defect; AFM=*Aframomum melegueta*; AFD= *Aframomum danielli*

Table S3: Hormonal (Testosterone and Follicle Stimulating Hormone) assessment table.

GROUPS	TESTOSTERONE (ng/mL)	FSH (mIU/mL)
Normal (control)	3.803±0.179	2.001±0.020
Scopolamine-induced rats	2.077±0.052*	1.296±0.134*
SID + Donepezil (5 mg/kg)	2.871±0.435^{b}	1.744±0.065$^{b\&}$
SID+ 4% AFM inclusion diet	3.069±0.551$^{\&}$	2.076±0.136$^{a\&}$
SID+ 8% AFM inclusion diet	3.962±0.116$^{a\&}$	2.135±0.028$^{a\&}$
SID+ 4% AFD inclusion diet	2.662±0.304^{b}	1.945±0.078$^{\&}$
SID+ 8% AFD inclusion diet	2.750±0.473^{b}	2.003±0.022$^{\&}$

Results are expressed in Mean ± SD (n = 4). Statistical differences were determined using one-way ANOVA followed by Tukey's post-hoc test.
*Values are significantly (P< 0.05) different compared with normal (control) group;
$^{\&}$ Values are significantly (P< 0.05) different compared with Scopolamine-induced rats;
a, b (different superscript letters) within a column indicates significant (P< 0.05);
values sharing same letter superscripts are not significantly different.

KEYS: FSH = Follicle Stimulating Hormone; AFM=*Aframomum melegueta*; AFD= *Aframomum danielli*

Table S4: Testicular oxidative stress markers and inflammatory markers assessment table.

GROUPS	MDA (mmol/mg protein)	ROS (Fluorescence unit)	IL-1β (pg/mL protein)	IL- 10 (pg/mL protein)
Normal (control) rats	0.298±0.030	30.420±2.858	36.620±1.126	2.269±0.711
Scopolamine-induced rats	0.774±0.045*	154.900±3.336*	84.720±1.865*	1.510±0.398
SID + Donepezil (5 mg/kg)	0.130±0.035$^{a\&}$	94.300±3.602$^{a\&}$	39.320±2.532$^{a\&}$	2.695±0.062
SID+ 4% AFM inclusion diet	0.291±0.022$^{b\&}$	104.400±3.081$^{cb\&}$	42.840±3.480$^{a\&}$	2.840±0.069
SID+ 8% AFM inclusion diet	0.272±0.026$^{b\&}$	82.600±4.806$^{b\&}$	36.520±2.566$^{\&}$	3.712±0.582$^{\&}$
SID+ 4% AFD inclusion diet	0.316±0.030$^{b\&}$	86.850±3.938$^{b\&}$	38.040±6.826$^{\&}$	2.898±0.286
SID+ 8% AFD inclusion diet	0.213±0.064$^{\&}$	76.470±6.664$^{a\&}$	31.550±2.112$^{b\&}$	3.894±0.365$^{\&}$

Results are expressed in Mean ± SD (n = 4). Statistical differences were determined using one-way ANOVA followed by Tukey's post-hoc test.

*Values are significantly (P< 0.05) different compared with normal (control) group;

$^{\&}$ Values are significantly (P< 0.05) different compared with Scopolamine-induced rats;

a, b, c (different superscript letters) within a column indicates significant (P< 0.05);

values sharing same letter superscripts are not significantly different.

KEYS: MDA = Malondialdehyde (lipid peroxidation); ROS = Reactive oxygen species; IL-1β = Interleukin-**1**β; IL-10 = Interleukin-**1**0; AFM=Aframomum melegueta; AFD= Aframomum danielli

Table S5: Enzymatic and non-enzymatic antioxidants assessment table.

GROUPS	SOD (min/mg protein)	CAT (min/mg protein)	TSH (mmol/mg protein)	NSH (mmol/mg protein)
Normal (control) rats	76.190±2.062	3.420±0.116	$1.37e^{-4}$± $3.40e^{-6}$	$4.48e^{-4}$±$4.77e^{-5}$
Scopolamine-induced rats	41.370±2.640*	1.534±0.077*	$7.60e^{-5}$± $3.95e^{-6}$*	$1.45e^{-4}$±$4.11e^{-5}$*
SID + Donepezil (5 mg/kg)	114.800±1.473$^{a\&}$	4.529±0.499$^{a\&}$	$1.04e^{-4}$± $5.40e^{-6}$$^{a\&}$	$4.65e^{-4}$±$1.95e^{-5}$$^{a\&}$
SID+ 4% AFM inclusion diet	98.910±1.304$^{b\&}$	3.653±0.053$^{b\&}$	$1.19e^{-4}$± $4.21e^{-6}$$^{bc\&}$	$3.78e^{-4}$±$3.51e^{-5}$$^{a\&}$
SID+ 8% AFM inclusion diet	114.900±1.875$^{a\&}$	4.021±0.582$^{\&}$	$1.49e^{-4}$± $3.21e^{-6}$$^{b\&}$	$5.16e^{-4}$±$3.78e^{-5}$$^{b\&}$
SID+ 4% AFD inclusion diet	94.600±3.679$^{b\&}$	3.957±0.091$^{\&}$	$1.19e^{-4}$± $4.20e^{-6}$$^{bc\&}$	$3.59e^{-4}$±$1.90e^{-5}$$^{bc\&}$
SID+ 8% AFD inclusion diet	108.800±3.499$^{a\&}$	4.470±0.079$^{\&}$	$1.36e^{-4}$± $1.03e^{-5}$$^{b\&}$	$5.53e^{-4}$±$3.22e^{-5}$$^{b\&}$

Results are expressed in Mean ± SD (n = 4). Statistical differences were determined using one-way ANOVA followed by Tukey's post-hoc test.
*Values are significantly (P< 0.05) different compared with normal (control) group;
$^{\&}$ Values are significantly (P< 0.05) different compared with Scopolamine-induced rats;
a, b, c (different superscript letters) within a column indicates significant (P< 0.05);
values sharing same letter superscripts are not significantly different.

KEYS: SOD = Superoxide dismutase; CAT = Catalase; TSH = Total thiol; NSH = non-protein thiol AFM=*Aframomum melegueta*; AFD= *Aframomum danielli*