Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Author/Year	Biological source	NP type, Size (nm)	Morphology	In vitro model[a]	Dose	Exposure time	Applied test	Major genotoxicity comments	Geno toxicity	Ref
Sarac et al. 2018	*Streptomyces griseorubens* AU2 (Bacterium)	Ag, 5-20 nm	Spherical	*Salmonella typhimurium*	50-250 μg/plate	24 h	Ames	No genotoxicity; strongest anti-mutagenic activity in *S. typhimurium* TA98 at 250 μg/plate.	No	[1]
Abdelsalam et al. 2018	*Corallina elongate* (Algae)	Ag, 7.5-25 nm	Spherical	*Triticum aestivum* L.	10-50 ppm	8, 16, and 24 h	Chromosomal aberration	AgNPs caused various types of chromosomal aberrations, such as incorrect orientation at metaphase, chromosomal breakage, metaphasic plate distortion, spindle dysfunction, and stickiness.	Yes	[2]
Remya et al. 2018	*Turbinaria ornate* (Algae)	Ag, 21-34 nm	Spherical	Y79	10-50 μg/mL	24 h	DNA fragmentation	AgNPs induced DNA fragmentation at all concentrations.	Yes	[3]
Raajshree et al. 2018	*Turbinaria conoides* (Algae)	ZnO, 70-120 nm	Spherical	DLA	50 μg/mL	24 h	DNA fragmentation	ZnONPs induced DNA fragmentation.	Yes	[4]
Maity et al. 2018	*Calotropis gigantean* (Plant)	Ag, 3-15 nm	Mostly spherical	EAC	5.6 μg/mL	24 h	DNA fragmentation, cell cycle analysis and western blot analysis	AgNPs induced DNA fragmentation, cell cycle arrest at the G2/M phase, upregulation of Bax and caspase-3 and downregulation of Bcl-2.	Yes	[5]
Lv et al. 2018	*Shewanella loihica* PV-4 (Bacterium)	Cu, 6-20 nm	Spherical	*Escherichia coli*	100 μg/mL	12 h	DNA fragmentation	CuNPs induced DNA fragmentation.	Yes	[6]
Şahin et al. 2018	*Punica granatum* (Plant)	Pt, Average: 20.12 nm	Cubical and spherical	MCF-7	25 and 100 μg/mL	48 h	Comet	Slight DNA damage was observed at 25 μg/mL, while significant DNA damage was observed at 100 μg/mL.	Yes (dose dependent)	[7]
Sulaiman et al. 2018	*Albizia adianthifolia* (Plant)	Iron oxide, 32-100 nm	Spherical	AMJ-13 and MCF-7	1.8 μg/mL for AMJ-13 and 7.7 μg/mL for MCF-7	16 h	DNA fragmentation and comet	Genotoxicity and DNA damage were confirmed by both the DNA fragmentation assay and comet assay.	Yes	[8]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Moteriya et al. 2018	*Caesalpinia pulcherrima* (Plant)	Ag, Average: 8 nm	Spherical	Normal human lymphocytes	2-200 μg	No data	Comet	No genotoxicity was observed at up to 50 μg, but fragmented DNA was found at 200 μg.	Yes (dose dependent)	[9]
Koca et al. 2018	*Mentha aquatic* (Plant)	TiO_2, Average: 69 nm	Spherical	pBR322 plasmid	62.5-500 μg/mL	24 h	DNA fragmentation	No genotoxicity was observed at up to 250 μg/mL, but DNA deformation was found at 500 μg/mL.	Yes (dose dependent)	[10]
Daphedar et al. 2018	*Albizia saman* (Plant)	Zn, 10-85 nm	Spherical	*Drimia indica*	4–16 μg/mL	6-24 h	Mitotic index and chromosomal aberration	ZnNPs had a mitodispersive effect on cell division and induced chromosomal abnormalities in a dose- and duration-dependent manner.	Yes	[11]
Yekeen et al. 2017	Cocoa pod husk and cocoa bean (Plant)	Ag, 4-54.22 nm	Spherical	*Allium cepa*	0.01–100 μg/mL	24, 48 and 72 h	Mitotic index and chromosomal aberration	AgNPs had a mitodispersive effect on cell division and induced chromosomal abnormalities.	Yes	[12]
Syed et al. 2017	*Rhizophora mangle* (Plant)	Ag, 10-60 nm	Spherical	*Staphylococcus aureus*	10 mg/mL	30 min	DNA fragmentation	AgNPs created fragmented DNA.	Yes	[13]
Pandurangan et al. 2017	*Perilla frutescens* (Plant)	Ag, Average: ~23 nm	Spherical and hexagonal	HeLa	0.1 and 0.2 mg/mL	24 h	Fluorescent Microscopy with AO and EB staining probes	The appearance of a green nucleus in AgNPs-treated cancer cells confirmed the induction of apoptosis. Moreover, chromatin and cytoplasm were condensed in the treated cells.	Yes	[14]
Jha et al. 2017	*Citrus maxima* (Plant)	Ag, 2-50 nm	Spherical	B16-F10	10 μg/mL	48 h	DNA fragmentation	AgNPs caused clear fragmentation of genomic DNA.	Yes	[15]
Fierascu et al. 2017	*Melissa officinalis* L. (Plant)	Ag, Au and Ag-Au, Average: 13 nm for Au, 10 nm for Ag, and 100 nm for Ag-	Spherical, triangular, hexagonal, rhombic, etc.	*Allium cepa*	10-20%	48 h	Mitotic index and chromosomal aberration	AgNPs were found not active on nuclear DNA damage. The AuNPs appeared nucleoprotective, but were aggressive in generating clastogenic aberrations in *A. cepa* root meristematic cells.	No (Ag) Yes (Au)	[16]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Verma et al. 2017	*S. aureus*, *B. thuringiensis* (gram-positive bacteria), and *E. coli*, *S. typhimurium* (gram-negative bacteria)	Au bimetallic Ag, 4.8-29.3 nm	Spherical	HCT116	50 and 250 µg/mL	24 and 48 h	Cell cycle analysis via propidium iodide staining of the nucleus	AgNPs biosynthesized from gram-negative strains showed higher cytotoxicity than AgNPs biosynthesized from gram-positive strains and induced greater oxidative stress, morphological changes, apoptosis, and cell cycle arrest in the G0/G1 phase.	Yes	[17]
Prasad et al. 2017	*Asparagus racemosus* (Plant)	CdS, 2-8 nm	Mostly spherical	Normal human lymphocytes	0.01 µg/µL	1 h	Comet	No DNA damage was observed.	No	[18]
Syed et al. 2017	*Turbinaria conoides* (Algae)	TiO_2, 60-100 nm	Irregular	*Salmonella typhimurium* viz., and normal human lymphocytes	0.312–5 mg/mL	48 h for bacterial samples and 3-6 h for human samples	Ames and chromosomal aberration	TiO_2NPs caused no DNA damage against *S. typhimurium* viz. Biosynthesized NPs had a geno-protective nature and nonmutagenic effect on normal human lymphocytes.	No	[19]
Saha et al. 2017	*Swertia chirata* (Plant)	Ag, Average: 20 nm	Mostly spherical	*Allium cepa*	5–20 µg/mL	4 h	Chromosomal aberration	Various chromosomal aberrations were observed even at low concentrations of AgNPs.	Yes	[20]
Panda et al. 2017	*Calotropis gigantea* L. (Plant)	ZnO, Average: 48.6 nm	Spherical to hexagonal	*Lathyrus sativus* L.	0–100 mg/L	15 h	Comet	ZnONPs induced significant DNA damage in a dose-dependent manner.	Yes (dose dependent)	[21]
Moteriya et al. 2017	*Caesalpinia pulcherrima* (Plant)	Ag, 2-22 nm Average: 12 nm	Spherical	Normal human	2–200 µg/mL	96 h	Comet and chromosomal aberration	DNA fragmentation and chromatid gaps in chromosomes were observed at 200 µg/mL, and these	Yes	[22]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

				lymphocytes				effects were less prominent at lower AgNP concentrations.	(dose dependent)	
Datkhile et al. 2017	*Nothapodytes foetida* (Plant)	Ag, No data	No data	K562	5-25 μg/mL	48 h	DNA fragmentation	AgNPs caused extensive double-strand breaks and DNA damage.	Yes	[23]
Guilger et al. 2017	*Trichoderma harzianum* (Fungus)	Ag, 20-30 nm	Spherical	*Allium cepa* for chromosomal aberration assay. 3T3, HeLa, HaCaT, V79 and A549 cells for comet assay.	[0.15–3.16] × 10^{12} NPs/mL for the chromosomal aberration assay and [0.15-0.47] × 10^{12} NPs/mL for the comet assay	24 h for the chromosomal aberration assay and 1 h for the comet assay	Comet and chromosomal aberration	AgNPs caused DNA damage in all of the mammalian cell lines tested as well as changes in the mitotic index and the alteration index due to chromosomal aberrations.	Yes	[24]
Barua et al. 2017	*Thuja occidentalis* (Plant)	Ag, 10-15 nm Average: 12.7 nm	Spherical	Super coiled DNA of pBR322 plasmid and calf thymus DNA	6.25–25 μg/mL	48 h	DNA fragmentation	No DNA strand scission was observed in the supercoiled DNA of pBR322 or calf thymus DNA.	No	[25]
Bhanumathi et al. 2017	*Syzygium cumini* (Plant)	Ag, 15-30 nm	Spherical	MCF-7 and MDA-MB-231	10–100 μg/mL	24 and 48 h	Western blot	AgNPs activated p53 and Bax by downregulating Bcl-2 expression.	Yes	[26]
Das et al. 2017	*Syzygium cumini* (Plant)	Au, Average: 15 nm	Heterogeneously shape	Normal human lymphocytes	No data	No data	Chromosomal aberration	No genotoxicity was found.	No	[27]
Baghbani-Arani et al. 2017	*Artemisia tournefortiana* Rchb (Plant)	Ag, Average: 22.89±14.82 nm	Spherical	HT29 and HEK293	61.38 μg/mL for HEK293 and 40.71 μg/mL for HT29	24 h	Quantitative real-time PCR	The Bax/Bcl-2 ratio was upregulated. In detail, an increase and decrease in the mRNA level of Bax and the Bcl-2 expression in cell lines were observed.	Yes	[28]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Banerjee et al. 2017	*Mentha arvensis* (Plant)	Ag, 3-9 nm	Spherical	MCF-7 and MDA-MB-231	1.56–12.5 μg/mL	2-48 h	Western blot	Upregulation of PARP1, P53, P21, Bax and cleaved caspase-9 was observed in MCF-7 cells, whereas Bcl2 was downregulated. In MDA-MB-231 cells, the mutant P53 protein was downregulated, whereas PARP1, P53, P21, Bax, cleaved caspase-9, procaspase-3 and cleaved caspase-3 proteins were upregulated.	Yes	[29]
Khalid et al. 2017	a) *Dictyosphaerium* sp. strain HM1 (DHM1) b) *Dictyosphaerium* sp. strain HM2 (DHM2) c) *Pectinodesmus* sp. strain HM3 (PHM3) (Microalgae)	Ag, Average: a) 22.5 nm for DHM1-AgNPs; b) 47.5 nm for DHM2-AgNPs; c) 57.5 nm for PHM3-AgNPs	DHM1-AgNPs and DHM2-AgNPs: spherical; PHM3-AgNPs: ovoid shape	MCF-7 and HepG2	10–50 μg/mL	24 h	DNA fragmentation	AgNPs caused DNA cleavage and fragmentation.	Yes	[30]
Datkhile et al. 2017	*Nothapodytes foetida* (Plant)	Ag, 10-50 nm	Spherical	MCF-7, HeLa, MCF-7, HCT15 and K562	1–20 μg/mL	48 h	DNA fragmentation	AgNPs caused DNA damage, upregulation of P53 and caspase-3 and downregulation of Bcl2 genes.	Yes	[31]
Chandrakasan et al. 2017	*Xenorhabdus stockiae* KT835471 (Bacterium)	Ag and Au, Average: 14±6 nm for AgNPs and 14±5 nm for AuNPs	AgNPs: spherical; AuNPs: spherical, ovoid and triangular	A549	29.4 μg/mL for AgNPs and 49.8 μg/mL for AuNPs	24 h	DNA fragmentation	AgNPs and AuNPs induced apoptosis through ROS-mediated DNA damage.	Yes	[32]
Das Nelaturi et al. 2017	*Allamanda Cathartica* L. (Plant)	Ag, Average: 35 nm	Spherical	PBMC	20–100 μg/mL	4 h	DNA fragmentation	AgNPs caused DNA cleavage and fragmentation.	Yes	[33]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Daphedar et al. 2017	*Albizia saman* (Jacq.) Merr. (Plant)	Ag, 55-83 nm	Spherical, triangular and irregular	*Drimia indica* (Roxb.) Jessop	25–100%	6-24 h	Chromosomal aberration	AgNPs created abnormalities in chromosomes such as a sticky metaphase, single bridge at anaphase, normal anaphase with micronuclei, anaphase with chromosome fragments, laggard anaphase, multipolarity at anaphase, disturbed metaphase, diagonal anaphase, and C-metaphase.	Yes	[34]
Şuţan et al. 2016	*Asplenium scolopendrium* L. (Plant)	Ag, No data	No data	*Allium cepa* L.	No data	6-24 h	Chromosomal aberration	The plant extract supplemented with AgNPs incurred a variable incidence of C-mitosis, anaphase bridges, and sticky chromosomes alongside vagrant chromosomes.	Yes	[35]
Mishra et al. 2016	*Hibiscus sabdariffa* (Plant)	Au, Average: 30 nm	Spherical	U87	1–2.5 ng/mL	24 h	DNA fragmentation	AuNPs caused DNA damage in a dose-dependent manner.	Yes (dose dependent)	[36]
Qi et al. 2016	*Magnetospirillum gryphiswaldense* MSR-1 (Bacterium)	Fe_3O_4, Average: 30 nm	Subspheroidal	ARPE-19	10–200 μg/mL	24 h	Comet	Biogenic Fe_3O_4 caused less DNA damage than chemically synthesized Fe_3O_4. However, both were found to be genotoxic and caused DNA damage.	Yes	[37]
Perde-Schrepler et al. 2016	*Cornus mas* (Plant)	Au, 2-24 nm Average: 12.079 ± 3.588 nm	Round and oval	HaCaT	6–15 μg/mL	24-48 h	Comet	AuNPs showed low toxicity, caused minimal ROS production and did not induce additional DNA lesions or an increase in inflammatory cytokine production.	No	[38]
Suganya et al. 2016	*Mimosa pudica* (Plant)	Au, Average: 12.5 nm	Spherical	MDA-MB-231 and MCF-7	4 μg/mL for MDA-MB-231 and 6 μg/mL for MCF-7	48 h	Comet	AuNPs caused significant damage to the DNA and lengthened the tails of condensed DNA compared to that observed in the control in both cell lines.	Yes	[39]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Suganya et al. 2016	*Musa paradisiaca* (Plant)	Au, <50 nm	Spherical	MCF-7 and MDA-MB-231	2 μg/mL for MDA-MB-231 and 8 μg/mL for MCF-7	48 h	Comet	Increased length of the comet tail (DNA damage) induced by AuNPs in both cell lines.	Yes	[40]
Panda et al. 2016	*Mangifera indica* L. (Plant)	Ag, 14-44.6 nm	Spherical	*Lathyrus sativus* L.	1–100 mg/L	3 h	Chromosomal aberration (CA), micronucleus formation and comet	AgNPs fabricated under four different reaction conditions caused DNA damage and were genotoxic. Moreover, using polyvinyl polypyrrolidone in the green synthesis of AgNPs resulted in an attenuation of their genotoxicity.	Yes	[41]
Farah et al. 2016	*Adenium obesum* (Plant)	Ag, 10-30 nm	Mostly spherical	MCF-7	50–150 μg/mL	24 h	Comet	AgNPs were found to be toxic at low concentrations (IC_{50}=73 μg/mL), with enhanced intracellular levels of ROS resulting in DNA damage, apoptosis and autophagy.	Yes	[42]
Elshawy et al. 2016	*Penicillium aurantiogriseum* (Fungus)	Ag, Average: 12.7 nm	Spherical	MCF-7	0.44–14 μg/mL	24 h	DNA fragmentation	AgNPs resulted in DNA strand breakage.	Yes	[43]
Jang et al. 2016	*Lonicera hypoglauca* (Plant)	Ag, 4.99-25.83 nm	Spherical	MCF-7	500 μg/mL	48 h	Western blot	AgNPs upregulated the p53 tumor suppressor gene and the subsequent increases in the expression of pro-apoptotic Bax, caspase-3 and caspase-9. In addition, AgNPs downregulated the mRNA levels of anti-apoptotic Bcl-2 and curtailed the JAK/STAT signaling in MCF-7 cancer cells.	Yes	[44]
Prabhu et al. 2016	*Setaria verticillata* L (Plant)	Ag, Average: 12±4 nm	Spherical	MCF-7 and A549	32.5-1000 μg/mL	24 h	DNA fragmentation	AgNPs resulted in double-strand breaks and the formation of DNA ladders in agarose gel, which are characteristic of apoptosis.	Yes	[45]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Prasannaraj et al. 2016	a) *Plumbago zeylanica* b) *Semecarpus anacardium* c)*Terminalia arjuna* (Plant)	Ag, a) 80–98, b) 60–95 c) 34–70 nm	Spherical and cuboid	HepG2 and PC3	1-100 μg/mL	48 h	DNA fragmentation	AgNPs resulted in DNA ladder formation and DNA damage.	Yes	[46]
Kayalvizhi et al. 2016	*Curculigo orchioides* (Plant)	Ag, 15-18 nm	Spherical	MDA-MB-231	10–100 μg/mL	48 h	DNA fragmentation	AgNPs resulted in DNA strand break.	Yes	[47]
Selvi et al. 2016	*Padina tetrastromatica* (Algae)	Ag, 40-50 nm	Predominantly round	MCF-7	50-200 μg/mL	24 h	DNA fragmentation	AgNPs did not cause any DNA fragmentation at 50 μg/mL and induced very little fragmentation at 100 μg/mL, and moderate apoptotic fragmentation at 200 μg/mL.	Yes (dose dependent)	[48]
Chandramohan et al. 2016	*Azadirachta indica* (Plant)	Ag, 30-50 nm	Mostly spherical	Peripheral erythrocytes of goldfish (*Carassius auratus*)	0-12 ppm	72 and 96 h	Comet and micronucleus assay	AgNPs caused no significant damage at doses below 12 ppm. However, after 72 and 96 h, AgNPs at 12 ppm resulted in nuclear abnormalities and damage to the nuclear membrane.	Yes (dose dependent)	[49]
Kajani et al. 2016	*Taxus baccata* (Plant)	Ag, 75.1 and 91.2 nm	Spherical	Caov-4	2.5 and 5 μg/mL	24 and 48 h	DNA fragmentation	AgNPs caused slight DNA fragmentation after 24 h at 2.5 μg/mL but obvious laddering patterns and double-strand breaks after 48 h at 5 μg/mL.	Yes (dose dependent)	[50]
Kalangi et al. 2016	*Anethum graveolens* (Plant)	Ag, Average: 35 nm	Mostly spherical	*Leishmania donovani*	50 μM	48 h	DNA fragmentation	AgNPs created no DNA breaks.	No	[51]
He et al. 2016	*Dimocarpus longan Lour.* (Plant)	Ag, 9-32 nm	Spherical	PC-3	10 μg/mL	24 h	Western blot	AgNPs inhibited prostatic cancer PC-3 cells and induced a	Yes	[52]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Bhakya et al. 2016	*Helicteres isora* (Plant)	Ag, 16-95 nm Average: 25.55 nm	Mostly spherical and oval	KB	70 μg/mL	48 h	Comet	decrease in stat 3, bcl-2, and survivin expression and an increase in caspase-3 expression. AgNPs caused DNA damage as fragmented DNA tails, olive tails, and tail length alterations.	Yes	[53]
Iram et al. 2016	*Fusarium oxysporum* (Fungus)	Tb_2O_3, Average: 10 nm	Mostly spherical	MG-63 and Saos-2	0.102 μg/mL	24 h	Nuclear morphology analysis by DAPI staining	Tb_2O_3NPs caused nuclear fragmentation associated with DNA damage, including typical tubular staining patterns and condensed nuclei.	Yes	[54]
Mata et al. 2016	*Abutilon indicum* (Plant)	Au, 1-20 nm	Spherical	HT-29	210 μg/mL	24 and 48 h	TUNEL, western blot, and cell cycle analysis	AuNPs caused negligible necrosis. In addition, AuNPs caused cell cycle arrest at the G1/S transition phase. Furthermore, the expression levels of active caspases (3, 8, 9) increased with an increasing AuNP concentration.	Yes	[55]
Azmath et al. 2016	*Colletotrichum* sp. (Fungus)	Ag, 20-50 nm	Spherical, nearly spherical, triangular and hexagonal	*Escherichia coli*	25-100 μg/mL	30 min	DNA fragmentation	AgNPs caused DNA deformation and damage.	Yes	[56]
Ashe et al. 2016	*Cucurbita maxima* (Plant)	Ag, Average: 76.10 ± 0.8 nm	Spherical	Saos-2	0.05-0.25 mM	12 h	Comet	A combination of AgNPs with glucose-derived glycation products caused DNA damage and cell death via apoptotic pathways, while glycated products alone induced cell death by necrosis.	Yes	[57]
Balashanmugam et al. 2016	*Cassia Roxburghii* (Plant)	Au, 25-35 nm	Spherical	HepG2	30 μg/mL	24 h	DNA fragmentation	AuNPs created fragmented DNA.	Yes	[58]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Balaji et al. 2016	*Trichoderma viride* (Fungus)	Ag, 5-40 nm	No data	MCF-7	40 and 130 μg/mL	24 h	DNA fragmentation and western blot	AgNPs created fragmented DNA. Moreover, western blot analysis showed inhibition of Bcl-2 and activation of Bax.	Yes	[59]
Qayyum et al. 2016	*Caryota urens, Pongamia glabra, Hamelia patens, Thevetia peruviana, Calendula officinalis, Tectona grandis, Ficus petiolaris, Ficus busking, Juniper communis, Bauhinia purpurea* (Plant)	Ag, 1-60 nm	Spherical, quasi-spherical, triangular and pentagonal	pBR322 plasmid	50 and 250 μg/mL	12 h	DNA fragmentation	AgNPs led to mild or little plasmid damage at 50 μg/mL, while severe plasmid DNA damage was found at 250 μg/mL.	Yes (dose dependent)	[60]
Thiruvengadam et al. 2015	*Bacillus marisflavi* (Bacterium)	Ag, 2-11 nm Average: 8 nm	Mostly spherical	Turnip (*Brassica rapa* ssp. rapa)	1-10 mg/L	12 h	DNA fragmentation, comet, and TUNEL	AgNPs caused extensive DNA damage and altered the expression of genes involved in a variety of metabolic pathways as well as the inhibition of chlorophyll and anthocyanin biosynthesis and an overproduction of ROS.	Yes	[61]
Parandhaman et al. 2015	*Rhizopus oryzae* (Fungus)	Si-Ag nanocomposite, Average: 20±4.5 nm	Mostly spherical	Genomic and plasmid DNA of *Escherichia coli* and *Pseudomonas aeruginosa*	0.25-2 mg/mL	5 h	DNA fragmentation	Exposure to Si-Ag nanocomposites resulted in a decrease in genomic and plasmid DNA band intensity in the treated cells in comparison to the control cells, indicating DNA damage, in a dose-dependent manner.	Yes	[62]
Jeyaraj et al. 2015	*Podophyllum hexandrum* (Plant)	Ag and Au, Ag: 12-40 nm;	No data	MCF-7	100 and 200 μg/mL for Ag and	24 h	DNA	AgNPs and AuNPs caused the upregulation of Bax, BCl2, caspase-6, caspase-9, PARP, and p53; the	Yes	[63]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

		Au: 5-35 nm			200 and 400 μg/mL for Au		fragmentation and western blot	downregulation of Bcl-2 and DNA fragmentation.		
Mata et al. 2015	*Abutilon indicum* (Plant)	Ag, 5-25 nm	Spherical	COLO 205	4-12 μg/mL	24 h	TUNEL and cell cycle assay	AgNPs induced no significant necrosis up to 8 μg/mL but caused 4% necrosis at 12 μg/mL. In addition, AgNPs arrested the cell cycle at the G1/S transition stage.	Yes (dose dependent)	[64]
Zahir et al. 2015	*Euphorbia prostrate* (Plant)	Ag and TiO_2, Average: 12.82± 2.50 nm for AgNPs and 83.22± 1.50 nm for TiO_2NPs	AgNPs: Spherical; TiO_2NPs: circular and irregularly shaped	*Leishmania donovani*	12.5-50 μg/mL	24 h	DNA fragmentation and TUNEL	DNA breakage was not extensive after AgNP exposure. However, high-molecular-weight DNA fragments of ~700 bp were observed, indicating that the mode of cell death may be largely due to necrosis.	Yes	[65]
Manna et al. 2015	*Lentinus squarrosulus* (Mont.) Singer (Fungus)	Ag, Average: 2.78 ± 1.47 nm	Mostly spherical	*Escherichia coli*	40 μg/mL	8 h	Flow cytometry	AgNPs caused an increase in side scattering intensity, supporting the internalization of AgNPs inside bacterial cells.	Yes	[66]
Subbaiya et al. 2015	*Nocardia mediterranei*-5016 (Fungus)	Ag, Average: 49.98 nm	Rod-shaped	NCI-H460	2-20 μg	24 and 48 h	Comet	AgNPs caused DNA damage in a time-dependent manner.	Yes (time dependent)	[67]
Gandhiraj et al. 2015	*Momordica charantia* (Plant)	Ag, Average: 96.3 nm	Spherical	MCF-7	12-100 μg/mL	24 h	DNA fragmentation	AgNPs caused DNA damage, resulting in fragmented DNA.	Yes	[68]
Dwivedi et al. 2015	*Pseudomonas aeruginosa* strain JS-11(Bacterium)	Ag, 5–23 nm	Mostly spherical	MCF-7	0.5-10 μg/mL	24 h	Cell cycle analysis and real-time PCR	The genes BCl2, cyclin D1, DNAJA1, E2F transcription factor 1, GPX1 and HSPA4 were upregulated. Some genes from the DNA damage and repair pathway, including XRCC2 and DDB1, were	Yes	[69]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

								negatively downregulated. Moreover, cell cycle analysis revealed an increase in the subG1 peak with a concomitant reduction in the G1 phase.		
Baskar et al. 2015	*Vitex negundo* L. (Plant)	Ag, 10-20 nm	Mostly spherical	*Brassica rapa* ssp. *pekinensis*	100-500 μg/mL	10 days	DNA fragmentation	Concentration-dependent DNA damage was observed in AgNP-treated plants. AgNPs at 500 μg/mL induced ROS generation and DNA damage.	Yes (dose dependent)	[70]
Chung et al. 2015	*Eclipta prostrate* (Plant)	ZnO, Average: 29±1.3 nm	Triangular, radial, hexagonal, rod-shaped, and rectangular	HepG2	1-500 μg/mL	24 h	DNA fragmentation	ZnONPs caused DNA damage as fragmented DNA.	Yes	[71]
Baharara et al. 2015	*Achillea biebersteinii* (Plant)	Ag, 10-40 nm	Spherical and pentagonal	MCF-7	1–100 μg/mL	24 and 48 h	Gene expression by RT-PCR	AgNPs downregulated the anti-apoptotic genes of the Bcl-2 family and unregulated the pro-apoptotic members, such as Bax.	Yes	[72]
Ramar et al. 2015	*Solanum trilobatum* (Plant)	Ag, 12.50-41.90 nm	Spherical	MCF-7	5-50 μg/mL	24 h	Western blot	AgNPs downregulated Bcl-2 but upregulated the activation of caspase-3 and caspase-9.	Yes	[73]
Gurunathan et al. 2015	*Bacillus tequilensis* (Bacterium)	Ag, Average: 20 nm	Spherical	MDA-MB-231	0-25 μg/mL	24 h	TUNEL and western blot	AgNPs induced DNA damage and cellular apoptosis via activation of p53, p-Erk1/2, and caspase-3 signaling and downregulation of Bcl-2.	Yes	[74]
Gurunathan et al. 2015	*Artemisia princeps* (Plant)	Ag, Average: 20 nm	Spherical	*Helicobacter pylori, Helicobacter felis*	1 μg/mL	12 h	DNA fragmentation	AgNPs induced DNA fragmentation.	Yes	[75]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Ismail et al. 2015	*Pleurotus ostreatus* (Fungus)	Ag, 13.1-24.1 nm; Average: 17.5 nm	Spherical	MCF-7 and HepG2	No data	48 h	DNA fragmentation	AgNPs induced DNA fragmentation and apoptosis in HepG2 and MCF-7 cells via suppression of Bcl-2 gene expression; upregulation of BAX; downregulation of Bcl2; and simulation of caspase, P53 and cytochrome c gene expression.	Yes	[76]
Namvar et al. 2015	*Sargassum muticum* (Algae)	ZnO, 10-15 nm	Hexagonal	WEHI-3	20-100 μg/mL	24-72 h	Western blot	ZnONPs caused a decrease in Bcl-2 expression and an increase in the level of Bax, suggesting disruption of mitochondrial membranes.	Yes	[77]
Parveen et al. 2015	*Cassia auriculata* (Plant)	Ag and Au, Average: 21 nm for Au and 20 nm for Ag	Spherical	A549, LNCap-FGC, and MDA-MB	10-30 μg/mL	24 h	DNA fragmentation	Ag and AuNPs caused DNA cleavage and exhibited genotoxicity in all cell lines.	Yes	[78]
Raman et al. 2015	*Rosa indica* (Plant)	Ag, 23.52-60.83 nm	Spherical	HCT-15	30 μg/mL	24 h	Western blot	AgNPs downregulated Bcl-2 and upregulated the activation of caspase-3 and caspase-9.	Yes	[79]
Krishnaraj et al. 2015	*Malva crispa* (Plant)	Ag, 5-50 nm	Spherical	*Bacillus cereus*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Salmonella typhi*, and *Salmonella enterica*	1-3 mM	30 min-24 h	DNA fragmentation	AgNPs did not show any genotoxic effects against any of the tested bacterial strains.	No	[80]
Hullikere et al. 2015	*Tragia involucrate* (Plant)	Ag, Within 100 nm	Rod-shaped	MOLT-4	10-100 μg/mL	24-72 h	DNA diffusion assay	DNA diffusion slightly increased, indicating genotoxicity.	Yes	[81]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Govindaraju et al. 2015	*Sargassum vulgare* (Algae)	Ag, Average: 10 nm	Spherical	HL60	2.84 μg/mL	48 h	DNA fragmentation	AgNPs induced DNA fragmentation.	Yes	[82]
Ortega et al. 2015	*Cryptococcus laurentii* (BNM 0525) (Fungus)	Ag, Average: 35±10 nm	No data	MCF7, T47D, and MCF10-A	5 μg/mL	12 h	Western blot	Caspase-9 was overexpressed, and caspase-3/7 activity was increased in MCF7 and T47D; in MCF10-A cells, caspase and Bcl-2 were maintained at constant levels.	Yes	[83]
Raman et al. 2015	*Pleurotus djamor* var. (Plant)	Ag, 5-50 nm	Spherical	PC3	10 and 40 μg/mL	24 h	Comet	Cells treated with 40 μg/mL AgNPs showed a higher tail DNA than cells treated with 10 μg/mL AgNPs and control cells.	Yes (dose dependent)	[84]
Vijaya et al. 2014	*Ocimum sanctum* (Plant)	Ag, Average: >100 nm	Spherical	Normal human lymphocytes	50-200 μg/mL	48 h	Chromosomal aberration	AgNPs reduced the chromosomal damages due to cyclophosphamide and showed an antigenotoxic activity.	No	[85]
Rajasekharreddy et al. 2014	*Sterculia foetida* L. (Plant)	Ag, 6.9±0.2 nm	Spherical	HeLa	16 μg/mL	24 h	DNA fragmentation	AgNPs created extensive double-strand breaks.	Yes	[86]
Krishnasamy et al. 2014	*Indigofera aspalathoides* (Plant)	Ag, No data	No data	Hep3B	194.65 μg/mL	24 and 48 h	DNA fragmentation	AgNPs induced nucleosomal DNA fragmentation.	Yes	[87]
Prasad et al. 2014	*Terminalia arjuna* (Plant)	Se, 10-80 nm	Spherical	Normal human lymphocytes	0.01 μg/μL	1 h	Comet	SeNPs prevented the manifestation of genotoxic effects in lymphocytes treated with arsenite.	No	[88]
Sarkar et al. 2014	*Alternaria alternate* (Fungus)	ZnO, 45-150 nm Average: 75±5 nm	Spherical, triangular and hexagonal	Normal human lymphocytes	125-1000 μg/mL	3 h	Comet	A significant increase in DNA fragmentation was induced at 1000 μg/mL.	Yes (dose dependent)	[89]
Kumar et al. 2014	*Paederia foetida* (Plant)	Ag, 2-20 nm Average: 8.9±3.6 nm	Spherical	Calf thymus and *Escherichia coli*	0-50 μg/mL	1 h for calf thymus and	DNA fragmentation	No genotoxicity was found.	No	[90]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

						24 h for E. *coli*				
El-Kassas et al. 2014	*Corallina officinalis* (Algae)	Au, Average: 14.57±1 nm	Spherical	MCF-7	0.75-6 μg/mL	48 h	DNA fragmentation	No DNA damage was found up to 1.5 μg/mL; however, significant DNA damage was observed at 3 and 6 μg/mL.	Yes (dose dependent)	[91]
Chowdhury et al. 2014	*Macrophomina phaseolina* (Fungus)	Ag, 5-40 nm; most were 16-20 nm	Spherical	pZPY112 plasmid	0.51-5.1 μg	2 h	DNA fragmentation	Genotoxicity was manifested as the degradation of plasmids, even at low concentrations.	Yes	[92]
Krishnaraj et al. 2014	*Acalypha indica* Linn (Plant)	Ag and Au, 20-30 nm	Spherical	MDA and MB-231	1-100 μg/mL	48 h	DNA fragmentation	Both AgNPs and AuNPs caused DNA damage and fragmentation.	Yes	[93]
Lima et al. 2014	*Fusarium oxysporum* (Fungus)	Ag, Average: 40.3±3.5 nm	Spherical	3T3, normal human lymphocytes and *Allium cepa*	0.5-10 μg/mL	1 h for 3T3 cells and human lymphocytes and 24 h for the *Allium cepa* assay	Comet and chromosomal aberration	AgNPs at 5 and 10 μg/mL had a genotoxic effect; however, at 0.5-1 μg/mL, no genotoxicity was observed.	Yes (dose dependent)	[94]
Singh et al. 2014	*Anabaena doliolum* (Bacterium)	Ag, 10-50 nm	Spherical	COLO 205	1-50 μg/mL	24 h	DNA fragmentation	DNA fragmentation increased significantly with an increasing AgNP concentration.	Yes (dose dependent)	[95]
Varun et al. 2014	*Argemone mexicana* (Plant)	Au, Average: 26±5 nm	Spherical	MCF-7	100 μg/mL	48 h	DNA fragmentation	AuNPs caused extensive double-stranded DNA breaks.	Yes	[96]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Subbaiya et al. 2014	*Streptomyces olivaceus* sp-1392 (Bacterium)	Ag, Average: 200 nm	Spherical	NCI-H460	9.48 and 12.52 μg/mL	24 and 48 h	Comet	AgNPs caused DNA breakage and damage by increasing the amount of tail DNA, tail length, and olive tail moment.	Yes	[97]
Ashokkumar et al. 2014	*Cajanus cajan* (Plant)	Au, 9-41 nm	Spherical	HepG2	246 μg/mL	48 h	Comet	AuNPs caused DNA damage by increasing the amount of tail DNA, tail length, tail moment, and olive tail moment in HepG2 cells.	Yes	[98]
Jeyaraj et al. 2014	*Podophyllum hexandrum* L. (Plant)	Au, Average: 15 nm	Spherical and triangular	HeLa	20 μg/mL	24 h	Comet, western blot, and DNA fragmentation	AuNPs increased the amount of tail DNA, tail length, tail moment and olive tail moment in HeLa cells. A DNA ladder was formed in AuNP-treated cells. The level of Bcl-2 expression was reduced, and the level of Bax was increased.	Yes	[99]
Prasad et al. 2013	Lemon plant	Se, 60-80 nm	Spherical	Normal human lymphocytes	0.01 μg/μL	1 min	Comet	SeNPs caused less cell death of lymphocytes and prevented DNA damage when cells were exposed to UVB radiation.	No	[100]
Rosarin et al. 2013	*Phyllanthus emblica* (Plant)	Ag, Average: 188 nm	Spherical and cubic	Hep2	20 μg/mL	24 h	DNA fragmentation	AgNPs caused DNA fragmentation.	Yes	[101]
Neveen et al. 2013	*Aspergillus terreus* (Fungus)	Ag, 20-140 nm	Spherical	*Aspergillus fumigatus*	15 μg/mL	36 h	Comet	AgNPs caused DNA damage and an increase in DNA tail length.	Yes	[102]
Mohanty et al. 2013	a) *Alstonia macrophylla* (Plant) b) *Trichoderma* sp. (Fungus)	Ag, Average: a) 50 nm; b) 100 nm	Spherical	RAW264.7 macrophages	5 and 10 ppm	12 h for the comet assay and 6 h for the micronucleus assay	Comet and micronucleus assay	No DNA damage was observed at 5 ppm; however, significant micronuclei formation and DNA damage were observed at 10 ppm for both phytosynthesized and mycosynthesized AgNPs.	Yes (dose dependent)	[103]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Jeyaraj et al. 2013	*Sesbania grandiflora* L. (Plant)	Ag, Average: 22 nm	Spherical	MCF-7	0-50 μg/mL	24 and 48 h	Comet	AgNPs caused DNA breakage in the form of tail formation.	Yes	[104]
Jeyaraj et al. 2013	*Podophyllum hexandrum* L. (Plant)	Ag, 12-40 nm	Mostly spherical	HeLa	20 μg/mL	24 h	Comet, western blot, and DNA fragmentation	AgNPs increased the amount of tail DNA, tail length, tail moment and olive tail moment in HeLa cells. A DNA ladder was formed in AgNP-treated cells. The level of Bcl-2 expression was reduced, and the level of Bax was increased.	Yes	[105]
Prabhu et al. 2013	*Vitex negundo* L. (Plant)	Ag, 5-47 nm	Spherical	HCT15	20 and 100 μg/mL	48 h	Comet	AgNPs caused long tail formation and DNA damage.	Yes	[106]
Geetha et al. 2013	*Couroupita guianensis* (Plant)	Au, 7-48 nm	Spherical, triangular, tetragonal and pentagonal with irregular contours	HL-60	60-180 μg/mL for the comet assay and 0-150 μg/mL for the DNA fragmentation assay	48 h	Comet and DNA fragmentation	AuNPs caused long tail formation (DNA damage) and genotoxicity.	Yes	[107]
Govender et al. 2013	*Albizia adianthifolia* (Plant)	Ag, 4-35 nm	Mostly spherical	A549	43 μg/mL	6 h	Comet and western blot	Fragmentation of DNA was significantly induced by AgNPs. In addition, AgNPs increased the expression of p53, Bax and PARP-1.	Yes	[108]
Chunyan et al. 2013	a) Mint; b) Coffee; c) Ginger (Plant)	Ag, a) 5-10 nm; b) 30-40 nm; c) 5-10 nm and 30-40 nm	Mostly spherical	HeLa and HepG2	20 μg/mL	24 h	Cell cycle analysis	AgNPs caused DNA damage followed by cell cycle arrest in the G2/M stage and eventually cell death through apoptosis. This DNA damage was more significant for AgNPs synthesized by a mint-mediated method.	Yes	[109]
Gurunathan et al. 2013	*Ganoderma neo-japonicum* (Fungus)	Ag, 10-15 nm	Spherical	MDA-MB-231	6 μg/mL	24 h	DNA fragmentation and TUNEL	AgNPs induced cell death through ROS generation, caspase-3 activation, and DNA fragmentation.	Yes	[110]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Gurunathan et al. 2013	*Bacillus funiculus* (Bacterium)	Ag, Average: 20 nm	Mostly spherical	MDA-MB-231	8.7 μg/mL	24 h	DNA fragmentation	AgNPs induced DNA fragmentation.	Yes	[111]
Wu et al. 2013	*Polyporus rhinoceros* (Fungus)	Se, Average: 50 nm	Spherical	A549	10 and 20 μM	24 h	TUNEL-DAPI costaining assay and cell cycle analysis	SeNPs induced G2/M phase arrest. In addition, DNA fragmentation and nuclear condensation were detected.	Yes	[112]
Gurunathan et al. 2013	*Escherichia fergusoni* (Bacterium)	Ag, 10-80 nm	Spherical	MCF-7	17.4 μg/mL	24 h	DNA fragmentation	AgNPs induced DNA fragmentation.	Yes	[113]
Tamboli et al. 2013	*Exiguobacterium* sp. KNU1 (Bacterium)	Ag, 5-50 nm	Spherical	*Salmonella typhimurium*, *Pseudomonas aeruginosa, Escherichia coli* and *Staphylococcus aureus*	25 μg/mL	4 h	DNA fragmentation	AgNPs revealed the fragmentation of DNA in the *E. coli* cells; however, no significant DNA damage was found in other bacteria.	Yes	[114]
Das et al. 2013	*Phytolacca decandra, Gelsemium sempervirens, Hydrastis canadensis* and *Thuja occidentalis* (Plant)	Ag, Average: approximately 100 nm	Mostly spherical	A375	80 and 160 μg/mL	24 h	Comet, cell cycle assay and DNA fragmentation	A DNA fragmentation study showed smear DNA in agarose gel, indicating DNA damage, while the comet assay did not show any fragmented DNA. AgNPs inhibited DNA synthesis and cell proliferation through G2/M cell cycle arrest.		[115]
Bhattacharyya et al. 2012	*Phytolacca decandra* (Plant)	Ag, Average: 91 nm	Spherical	A549	80 and 100 μg/mL	24 h	Comet and DNA fragmentation	AgNPs caused DNA fragmentation as well as an increase in DNA tail formation, indicating genotoxicity.	Yes	[116]
Mishra et al. 2012	*Azadirachta indica* (Neem) (Plant)	Ag, 2–18 nm	Spherical	SiHa	4, 8, 30, and 60 μg/mL	48 h	DNA fragmentation	AgNPs caused extensive double-strand breaks, thereby yielding a ladder-like appearance on agarose gel.	Yes	[117]

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

Bendale et al. 2012	*Dolichos biflorous, Ocimum sanctum, Euphorbia neriifolia, Sesbania grandiflora, Piper betle, Calospropris procera, Asteracantha longifolia* (Plant)	Pt, Average: 137.5 nm	Cubic	A375	100 μg/mL	24, 48, and 72 h	DNA fragmentation	PtNPs induced DNA damage in a time-dependent manner.	Yes (time dependent)	[118]
Sarkar et al. 2011	*Alternaria alternate* (Fungus)	Ag, 20-45 nm Average: 28±4 nm	Spherical	Normal human lymphocytes	50-400 μg/mL	3 h	Comet	AgNPs caused significant DNA tail formation at 300 μg/mL; however, slight DNA damage was observed at lower concentrations.	Yes (dose dependent)	[119]
Satyavani et al. 2011	*Citrullus colocynthis* (Plant)	Ag, Average: 31 nm	Spherical	HEp-2	500 nM	6 h	DNA fragmentation	AgNPs caused extensive double-strand breaks.	Yes	[120]
Panda et al. 2011	*Pandanus odorifer* (Plant)	Ag, 24-55 nm Average: 37±11 nm	Mostly spherical	*Allium cepa* L.	5-80 μg/mL	12, 24 and 48 h	Comet and micronucleus assay	AgNPs induced DNA damage in a dose-dependent manner. DNA damage was significantly enhanced at doses ≥20 μg/mL.	Yes (dose dependent)	[121]
Singh et al. 2010	*Actinobacter* spp. (Bacterium)	TiO_2 and ZnO, Average: 5.5 nm for TiO_2 and 7 nm for ZnO	Spherical	A431	10^{-3}- 10^{-12} M	3 h	Comet	ZnONPs at concentrations up to 10^{-5} M caused DNA damage as a significant increase in the percentage of tail DNA. TiO_2 at concentrations up to 10^{-3} M did not cause a significant increase in percentage tail DNA.	Yes (dose dependent)	[122]

[a]**Cancer and normal cell Lines:** Y79 (human retinoblastoma), DLA (Dalton's lymphoma), EAC (Ehrlich's ascites carcinoma), MDA-MB-231 (human breast adenocarcinoma), MCF-7 (human breast adenocarcinoma), A549 (human lung adenocarcinoma), A375 (human malignant melanoma), AMJ-13 (human invasive ductal carcinoma), HeLa (human cervical cancer), B16-F10 (mouse melanoma), K562 (human leukemic), HT29 (human colorectal adenocarcinoma), HepG2 (human hepatocellular carcinoma), HCT-15 (human Dukes' type C, colorectal adenocarcinoma), U87 (human glioblastoma), PC-3 (human prostate carcinoma), Caov-4 (human

Table S1. *In vitro* genotoxicity studies of biologically synthesized MNPs.

ovarian adenocarcinoma), KB (human carcinoma), MG-63 (human osteosarcoma), Saos-2 (human osteosarcoma), HT-29 (human colorectal adenocarcinoma), COLO 205 (human Dukes' type D, colorectal adenocarcinoma), NCI-H460 (human nonsmall cell lung carcinoma), WEHI-3 (mouse leukemia), LNCap-FGC (human prostate carcinoma), MDA-MB (human adenocarcinoma mammary gland), MOLT-4 (human acute lymphoblastic leukemia), T47D (human ductal carcinoma), MCF10-A (human breast epithelial cell), Hep3B (human hepatocellular carcinoma), Hep2 (human carcinoma), HCT116 (human colorectal carcinoma), HL-60 (acute promyelocytic leukemia), SiHa (human cervical cancer cell), A431 (human epithelial carcinoma), RAW264.7 (mouse macrophage), ARPE-19 (human retinal pigment epithelium cell), HaCaT (human keratinocyte), normal human lymphocyte, PBMC (peripheral blood mononuclear cell), HEK293 (human embryonic kidney cell), 3T3 (mouse embryo), and V79 (hamster lung fibroblast).

Table S2. *In vivo* genotoxicity studies of biologically synthesized MNPs.

Author/Year	Biological source	NP type, Size (nm)	Morphology	*In vivo* model	Dose	Exposure time	Genotoxicity assay	Major genotoxicity comments	Genotoxicity (Yes or No)	Ref
Adiguzel et al. 2018	*Streptomyces* sp. AOA21 (Bacterium)	Ag, 35-60 nm	Spherical	*Saccharomyces cerevisiae*	12.5-100 µg/mL	3 h	Comet	AgNPs at 12.5 and 25 µg/mL led to insignificant DNA damage. However, AgNPs at 50 and 100 µg/mL resulted in significant DNA damage.	Yes (dose dependent)	[123]
Pandiarajan et al. 2018	*Morus alba* (Plant)	Ag, No data	No data	Larva of mulberry silkworm *Bombyx mori*	1-100 ppm	No data	DNA fragmentation, and Bm-actin amplification	A high mortality rate at 100 ppm and a moderate mortality rate at 10 ppm were observed during larval-pupal transition and pupal-adult transition. Significant DNA fragmentation was observed at 100 ppm. In addition, Bm-actin marker gene amplification revealed the null amplification at 10 and 100 ppm, respectively.	Yes (dose dependent)	[124]

Table S2. *In vivo* genotoxicity studies of biologically synthesized MNPs.

Gavade et al. 2017	*Ziziphus jujuba* (Plant)	Cu_xO/ZnO, $Ag@Cu_xO/ZnO$ and $Au@Cu_xO/ZnO$ (x= I and II), 15-40 nm	Hexagonal and irregular	*Cyprinus carpio* blood	No data	No data	Comet	NPs significantly induced genotoxicity even at low concentrations.	Yes	[125]
Ishwarya et al. 2017	*Cissus quadrangularis* (Plant)	Ag, No data	No data	Larvae of *Poecilia reticulata* fishes and adults of the microcrustacean *Ceriodaphnia cornuta*	10, 20 and 40 μg/mL	24 h	DNA fragmentation	AgNPs at 40 μg/mL led to remarkable DNA damage in *C. cornuta*, whereas in *P. reticulata*, 20 μg/mL AgNPs led to DNA damage.	Yes	[126]
Krishnaraj et al. 2016	*Malva crispa* Linn. (Plant)	Ag, 5-50 nm	Spherical	Zebrafish (*Danio rerio*)	23.7-331.8 μg/L	96 h	Micronuclei and nuclear abnormality test	AgNPs showed micronuclei and nuclear abnormalities such as blebbed nuclei, lobed nuclei, and notched nuclei in peripheral blood cells, indicating genotoxicity.	Yes	[127]
Beheshti et al. 2013	*Bacillus* sp. MSh-1 (Bacterium)	Se, 80-220 nm	Spherical	*Leishmania major* promastigotes	1-150 μg/mL	24 h	DNA fragmentation	SeNPs induced DNA fragmentation in a dose-dependent manner.	Yes (dose dependent)	[128]
Antony et al. 2013	*Ficus religiosa* (Plant)	Ag, 5-35 nm	Spherical	Dalton's ascites lymphoma (DAL) in a mouse model	25-100 μg/mL	11 days	DNA fragmentation	AgNPs caused DNA damage in DAL cells by initiating apoptosis.	Yes	[129]

Table S2. *In vivo* genotoxicity studies of biologically synthesized MNPs.

Sukirtha et al. 2011	*Areca catechu* Linn. (Plant)	Ag, Average: 80 nm	Spherical	Mice bearing DAL tumor cells	600-1000 μg	10 days	DNA fragmentation	AgNPs created fragmented DNA in DAL-induced tumor cells.	Yes	[130]

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