WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review on Isatin Derivatives with Anti-Cancer Activity

Dr. Vineethchandy, Dr.Visagaperumal, Abdulkarimrabiubala, K. Sangeetha.

Department of Pharmaceutical Chemistry, T. John College of Pharmacy, RGUHS Bangalore, Karnataka,India

ABSTRACT

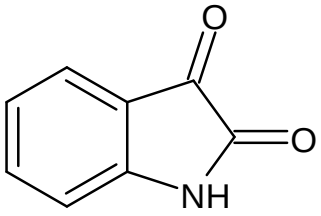
The present review focuses on the various synthesis of Isatin derivatives of different anti-cancer or anti-tumor, it has distinct and discontinuous distribution in the brain, peripheral tissue and body fluids. It is most potent known in vitro actions are as an antagonist of atrial natriuretic peptide (ANP) function and NO signaling.It is also possible that the isatin may influence the in vivo pharmacological activity of compounds possessing the isatin moiety.

Keywords: Alccofine 1203, Steel Fiber, Cement ,Fine Aggregate , Coarse aggregate , Water Compressive strength, Split tensile strength, Flexural strength.

1. INTRODUCTION

1.1 Isatin

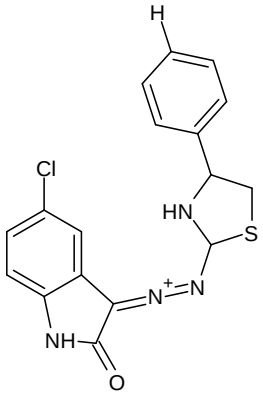
(2,3-dioxindole) is an endogenous compound and its effects have been reported in humans.A number of systems have been tested. Isatin has biological properties that include a Spectrum of brain actions and provide defence against some forms of infections[1]. It was discovered that Isatin is a natural Anumber of dyes, agrochemicals, and pharmacological structural motif by virtue of its particular size and size, active compounds Privileged digital properties[2]. Erdmann first discovered Isatin (1H-indole-2,3-dione), an oxidized derivative of indole.Laurent in 1840 as a commodity resulting from the use of nitric and chromic acid by oxidation[3].



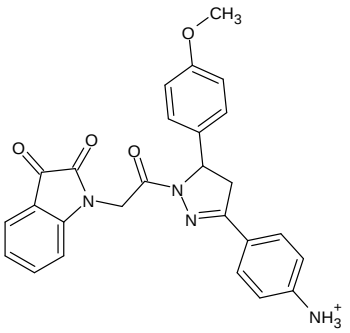
1*H*-indole-2,3-dione

REVIEW OF LITERATURE

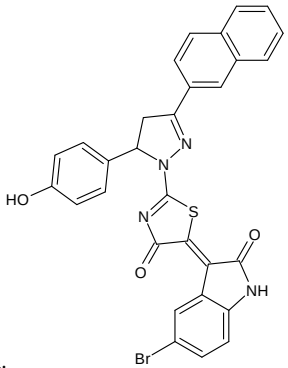
2.1)YaniHou*et al.*,reviewed the hybrids **18k, 20a, b**, and **28a, b**possessed broad-spectrum anticancer activity and conjugates **18k** and **24** with Nano molar level **GI50** or **IC50** values were highly active against different cancer cells in this sample. Compounds **6a** and **15b** were involved, respectively,compound **19a**against multidrug-resistant cancer cells, exhibited great anticancer potency in vivo[5].



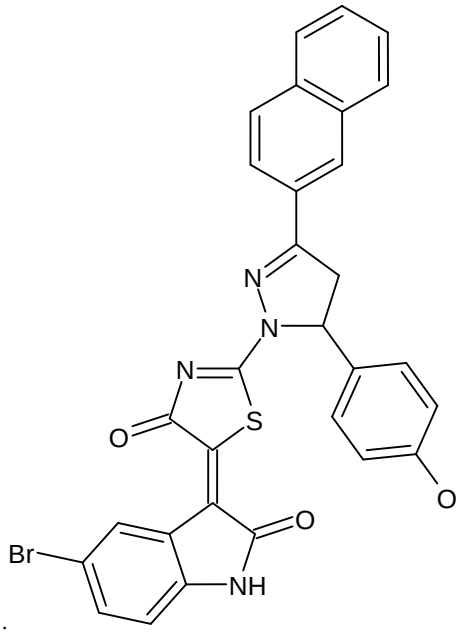
6a



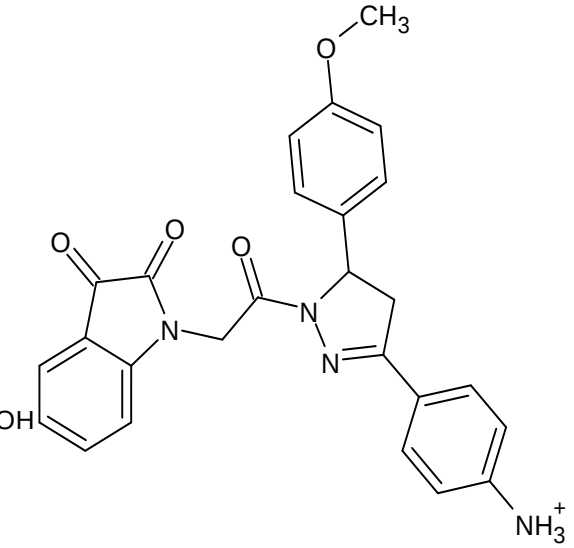
19.



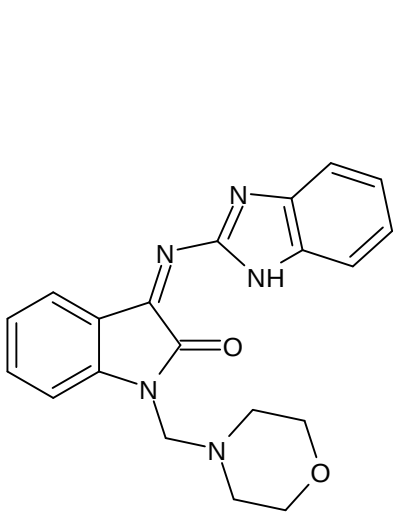
19a.



18K.



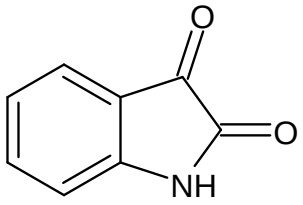
19.



24. 28.

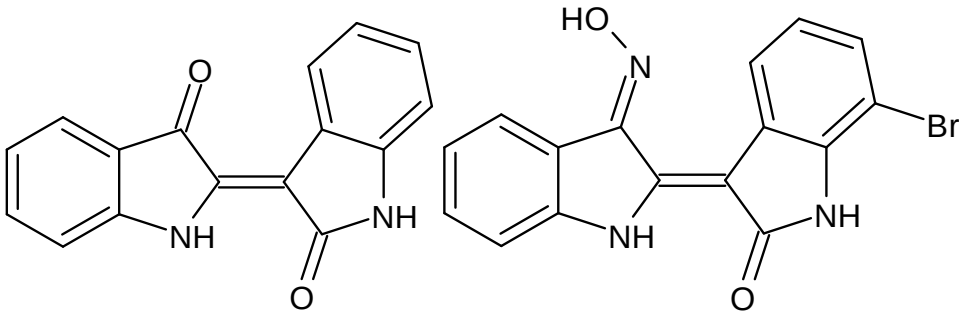
2.2)K. L. Vine*et al*.,reviewed the synthesis of Isatin derivatives as the central nucleus of an antineoplastic and cytotoxic variety of compound. In short, isatin has already proven itself to be a great scaffold.The natural and synthetic construction of molecules for both with biological activities that are interesting with the option of derivatisingthe positions **N1**, **C2** and**C3**, along with the substitution on the synthetic permutations for isatin are almost endless

with an aromatic ring. It reviewed the cytotoxic and anticancer activities of isatin analogues derived from either mono di and tri substitution of the aryl ring A or those obtain by the above derivatisation[6].

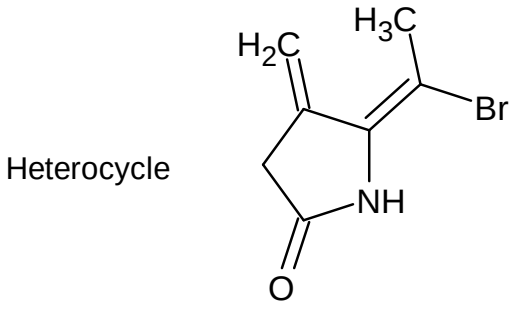


1*H*-indole-2,3-dione

2.3)Nikolai M. Evdokimov*et al*., reviewed the evaluation of anticancer ofIndirubin derivatives and associated isatinheterocycles have been shown toagainst a panel, their single to double digit micro molar activitylines of cancer cells composed of apoptosis-sensitive as well as apoptosis-sensitivethose with proven immune properties to apoptosis.The findings show that the majority of compounds synthesized aredemonstrating similar efficacy against resistant and responsive apoptosiscells, showing their ability to resolve the resistance of apoptosis.This type of compound may therefore be used as a starting point.Point of development of agents that are active against cancers associated with cancerwith dismal clinical results[7].



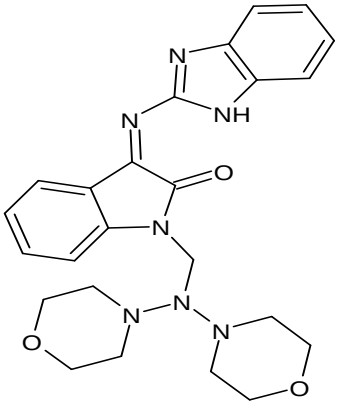
A. B.



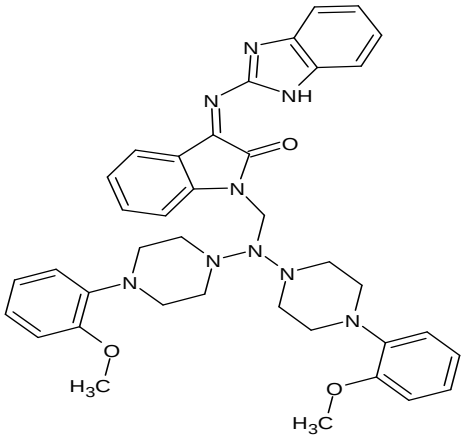
C.

2.4)AmnaQasem Ali*et al*., The total positive outcomesStudies of in vitro cytotoxic activity indicate that the CU(II)Complexes can be used as non-platinum anticancer tumoursNarcotics. Nonetheless, more research on the anti-proliferative mechanisms ofThe action of these complexes is needed[8].

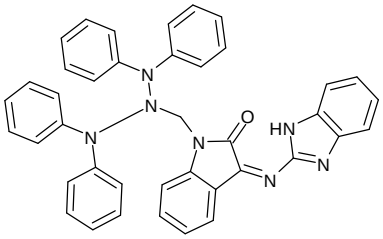
2.5)Azza T. Taher*et al*., Compound cytotoxicity **3a, 3b, 3c, 3d, 3g,4a, 4b, 4c, 4d, 4e**, and**4 g** were measured against the Cell line of human breast adenocarcinoma (MCF-7). For,or comparison purposes, doxorubicin cytotoxicity, a The standard antitumor drug was assessed in the sense of the Same situations. The IC50 (the required concentration50 percent cell viability inhibition) was estimated.Inhibition of MCF-7 Human Breast ProliferationIC50 cancer cells range from 22.59-64.14 nM[9].The best activity was obtained with compounds **4b**, **4d** and **4g.**



4b.



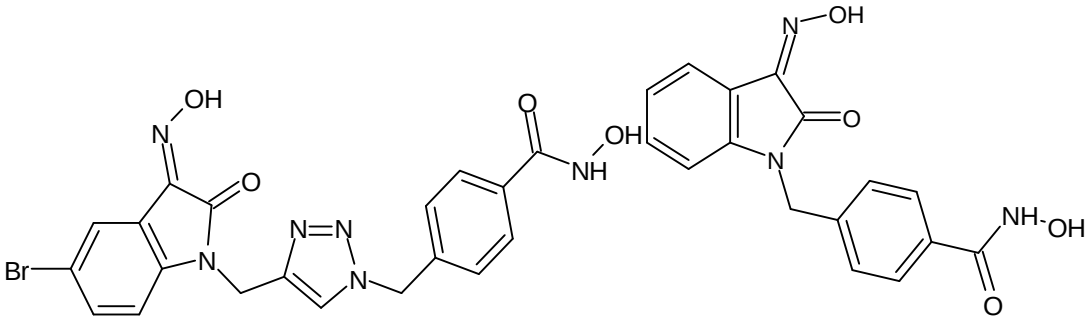
4d.



4g.

2.6] Ajmer Singhgrewal,In the MCF-7 human breast cancer cell line, the anti-breast cancer activity of certain synthesized compounds was assessed. For the anti-cancer function, new 2,3,5-trisubstituted 4-thiazolidinones bearing an isatin fragment were synthesized and assessed. (5'Z)-5'-(benzylidene)-3'-(4-chlorophenyl) spiro[3H-indole-3,2'-thia-zolidine]-2,4'(1H)-dione and (5'Z)-3'-(4-chlorophenyl)-5'-[4-(1-methylethyl)-benzylidene] spiro[3H-indole-3,2'-thiazolidine]-2,4'(1H)-dione were the superior compounds among the synthesized compounds[10].

2.7) Varuna*et al.*,It was checked that the isatinmoity behaves as a group of caps, where the **zn**$^{+}$ ion is binding as the hydroxamic acid. Novel hybrid derivatives in which the N-hydroxybenzamide and oxindole groups are connected by triazolemoity or by methylene such as **16,17**.have been synthesized have been replaced by the isatin derivative oxindole**c-3** known for its vibrant biological activity including cancer prevention. the application of **Br** at position **5** result in best cytotoxic compound[11].

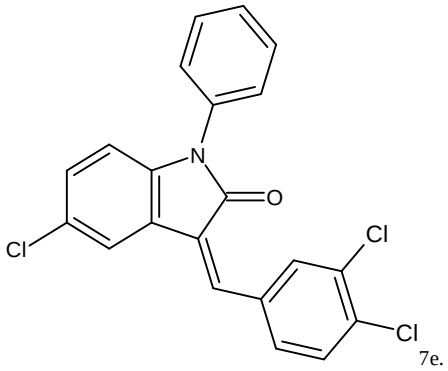


16.

17.

2.8)ChandraboseKarthikeyana*et al.*, A series of isatin-linked chalcones were successfully synthesized and evaluated for anti-breast cancer activity against three breast cancer cell lines by common pharmacophoric elements of isatin and chalcones. The findings show that synthesized isatin-linked chalcones were more effective against breast cancer cell lines than the widely used chemotherapeutic drug cisplatin. The possible inhibitory effect of the compounds on five protein kinases was also tested, and the results suggested that none of the compounds demonstrated kinase inhibition. Overall, the results indicate that the designed molecular framework is appropriate for use in the development of therapies for anti-breast cancer[12].

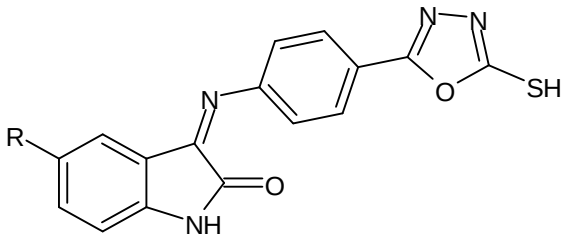
2.9)Sulayman A. Ibrahim *et al*., Two human cancer cell lines **K562** and **HepG2** were tested against the anticancer activities of the title compounds using **MTT** assay. The synthesized compounds were screened against **K562, HepG2, HT-29** and cell lines. Against all three cancer cell lines, compounds **7a, 7d,7e, and 7f** displayed strong anticancer activity.Meanwhile, Compound **7e** was found to be the most powerful compound with IC50 values **24.09 µM, 20.27 µM**, and **6.10 µM,** respectively, toward **HepG2, HT-29, K5622** cancer cell lines[13].



7e.

2.10)Raphael EnoqueFerraz de Paiva*et al*.,In this study, the findings of compounds already identified as anticancer agents based on isatin derivatives, both metallic and non-metallic, are compared and discussed. Isatin compounds can be derived from plants and marine animals and are also used as a metabolite of amino acids in human fluids. Its derivatives include imines, thiosemicarbazones, hydrazones,In our studies of oxindolimines' antitumor properties, all of these are strategies were tested and the logical creation of new strategies was allowed. Compounds with different action mechanisms, as well as some improvement in their responsiveness. There were different targetsinvestigated (DNA, mitochondria, CDKs, topoisomerase IB, alkaline, Phosphatase), causing the death of cells by apoptosis.The metal complex was more active than the corresponding free ligand in his studies[14].

2.11)Gudipati R*et al*., in his review, he synthesized 3-{4-(5-mercapto-1,3,4-oxadiazole-2-yl)phenylimino}indolin-2-one derivatives,compounds VIb-d with halogen atom (electron withdrawing groups) at C5 location demonstrated the most potent behavior among the synthesized 2-indolinones. These findings suggest that in the future, C5 substituted derivatives could be useful leads in the production of anticancer drugs[15].



3 CONCLUSION

The various Isatin derivatives are promising scaffold for pharmacological and medicinal compounds, according to the vast range of different biological properties this kind of compounds exhibit. A new series of 3-{4-(5-mercapto-1,3,4-oxadiazole-2-yl)phenylimino)-
5 or 7-substituted indolin-2-one derivatives were synthesized. Among all the synthesized compounds, 5-halo substituted compounds were found to be the most potent anticancer
agents in this study. These results indicate that C5 substituted derivatives may be useful leads for anticancer drug development in the future.

REFERENCES

1) Pandeya SN, Smitha S, Jyoti M, Sridhar SK. Biological activities of isatin and its derivatives. Acta Pharm. 2005 Mar 1;55(1):27-46.
2) Liang C, Xia J, Lei D, Li X, Yao Q, Gao J. Synthesis, in vitro and in vivo antitumor activity of symmetrical bis-Schiff base derivatives of isatin. European journal of medicinal chemistry. 2014 Mar 3;74:742-50.
3) Vine KL, Matesic L, Locke JM, Skropeta D. Recent highlights in the development of isatin-based anticancer agents. Adv. Anticancer Agents Med. Chem. 2013 Jun 14;2:254-312.
4) Joaquim FM, Simon JG, Angelo CP. The Chemistry of Isatins: a Review from 1975 to 1999. J. Braz. Chem. Soc. 2001;12(3):273-324.

5) Hou Y, Shang C, Wang H, Yun J. Isatin–azole hybrids and their anticancer activities. Archiv der Pharmazie. 2020 Jan;353(1):1900272.

6) Ranson M, Skropeta D, Locke J, Matesic L, Perrow KL. Cytotoxic and anticancer activities of Isatin and its derivatives: a comprehensive review from 2000-2008.

7) Evdokimov NM, Magedov IV, McBrayer D, Kornienko A. Isatin derivatives with activity against apoptosis-resistant cancer cells. Bioorganic & medicinal chemistry letters. 2016 Mar 15;26(6):1558-60.

8) Ali AQ, Teoh SG, Eltayeb NE, Ahamed MB, Majid AA. Synthesis of copper (II) complexes of isatinthiosemicarbazone derivatives: In vitro anti-cancer, DNA binding, and cleavage activities. Polyhedron. 2014 May 28;74:6-15.

9) Taher AT, Khalil NA, Ahmed EM. Synthesis of novel isatin-thiazoline and isatin-benzimidazole conjugates as anti-breast cancer agents. Archives of pharmacal research. 2011 Oct;34(10):1615-21.

10) Grewal AS. Isatin derivatives with several biological activities. Int. J. Pharm. Res. 2014 Jan;6(17):4.

11) Kakkar R. Isatin and its derivatives: a survey of recent syntheses, reactions, and applications. MedChemComm. 2019;10(3):351-68.

12) Karthikeyan C, Solomon VR, Lee H, Trivedi P. Design, synthesis and biological evaluation of some isatin-linked chalcones as novel anti-breast cancer agents: a molecular hybridization approach. Biomedicine & Preventive Nutrition. 2013 Oct 1;3(4):325-30.

13) Ibrahim SA, Elsaman T. Cytotoxic and anticancer activities of indoline-2,3-dione (Isatin) and its derivatives. Journal of Pharmaceutical Research International.2018 Feb 27:1-9.

14) Ferraz De Paiva RE, Vieira EG, Rodrigues Da Silva D, Wegermann CA, Ferreira AM. Anticancer compounds based on isatin-derivatives: strategies to ameliorate selectivity and efficiency. Frontiers in Molecular Biosciences. 2020;7:511.

15) Gudipati R, Anreddy RN, Manda S. Synthesis, characterization and anticancer activity of certain 3-{4-(5-mercapto-1, 3, 4-oxadiazole-2-yl) phenylimino} indolin-2-one derivatives. Saudi Pharmaceutical Journal. 2011 Jul 1;19(3):153-8.