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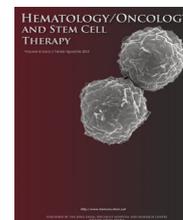
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# Hematopoietic stem cell transplantation in Pakistan – country report



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Pakistan is 6th largest country with over 180 million population. Overall life expectancy has increased from an average of 45–66 in last 70 years [1]. Annual per capita health expenditure is 39 \$, which is comparatively lower than other developing countries [2]. Consanguineous marriages have affected a great number of population in terms of hereditary disorders. Thalassemia, bone marrow failure syndromes, immunodeficiency states and hemophilia are common genetic disorders with high disease burden [3]. These diseases can be prevented otherwise by appropriate genetic counseling. Inadequate social security system, lack of awareness, inefficient prevention programs and deficiency of advanced diagnostics facilities, worsen the situation. Mostly of the genetic disorders are incurable and result in disability or death. With technological advancement and research in field of hematopoietic stem cell transplantation, it is emerging as possible cure of genetic disabilities. Establishment of transfusion facility, platelet separation and storage methods, developments in HLA typing and acquisition of knowledge in radiotherapy, laid the

foundation for stem cell research in Pakistan back in 1978. Technology transfer started in 1992, when respective individuals were trained in various aspects of bone marrow transplantation. Hematopoietic stem cell transplant (HSCT) activity started in 1995 with auto HSCT transplant on a patient with AML, but till 2004 only two transplant centers were functional with less than 50 transplants per year [4]. Currently there are 8 stem cell transplant centers accredited by national statutory body. In last 2 decades, 1851 HSCT have been carried out [5]. Most of the patients ( $n = 1592$ ) were of Allogenic (allo) HSCT and others were auto HSCT ( $n = 259$ ). Primary indications for allo HSCT were beta thalassemia ( $n = 603$ ), aplastic anemia ( $n = 540$ ) and acute leukemias ( $n = 169$ ). The autologous transplants were carried out mainly for lymphomas ( $n = 155$ ), multiple myeloma ( $n = 67$ ) and AML ( $n = 19$ ). Peripheral blood stem cells (PBSC) were used as source of stem cells in 903 cases, it was used as source, followed by bone marrow in 671 cases. While for 277 cases both the PBSC and marrow infusion were used simultaneously. Still the number of patients are few compared to the actual burden of diseases. For the year 2016, 9 persons per 10 million population underwent HSCT.

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The field of HSCT has expanded globally with the advent of cord blood stem cells storage and establishment of matched unrelated donor (MUD) registries in many countries. Pakistan being a resource-constrained country lacks the infrastructure for MUD registry or cord blood banks. The transplant activity is likely to increase due to recent developments in haplo identical HSCT. So far 35 haplo-identical transplants have been carried out in the country with encouraging results. With only a handful transplant centers; the waiting list for these patients is ever growing. Moreover, advanced health care facilities and diagnostics centers, are confined to the three larger cities, and only a hand full of population has access to that. Absence of registry for transplant and bone marrow donors, unavailability of cord blood banks, expensive chemotherapeutic agents and non-availability of monoclonal antibodies, remains obstacles in development of this newly emerging field.

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