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Platelet Parameters and Variations with Age amongst Elderly Nepalese Presenting in Bpkihs, Dharan

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Abstract

Purpose: The purpose of this study was to calculate normal range of platelet count and to find relationship of platelet count and MPV with age and sex.

Methods: Prospective study was done on 202 people visiting haematology department of BPKIHS, 100 as cases and 102 as controls. Platelet counts and MPV was measured by 5-part haematology analyser.

Results: Results showed that platelet count is higher in females and young individuals while platelet volume is higher in elderly males.

Conclusions: Study shows that there is insignificant difference between platelet count and MPV between elderly population and young control.

Keywords: Platelets; Platelet count; Mean platelet volume

Introduction

Ageing is decrease in working capacity of different organ system leading to increased chances of dysfunction and disease. Decline in pluripotent cytokines and growth factors result in decrease in haematopoietic stem cells disrupting normal system [1]. Hence, age factor should be considered [2].

Megakaryocytes fragments in the bone marrow to produce platelets which help in haemostasis and produce growth factors. Decrease or increase in their number and function cause platelet disorders [3].

Platelets lack nucleus and circulate at 150,000 to 450,000/mm^3[4]. Platelets are smaller in size and arise from larger megakaryocytes which are polyploidy. Platelets are determined to have average diameter of 2.5 μm, that corresponds to a mean platelet volume (MPV) of 8 to 10 Fl by distributing platelets through a monolayer at 7 to 21 per 100 × field on a wright stained wedge film.

Variations in platelet size are determined at the time of synthesis in bone marrow and these differences may cause cardiac problems [5].

Platelet heterogeneity arises at thrombopoiesis. Aging is not responsible for decrease in platelet size rather they are independent determinants of platelet function [6].

Studies done on fewer individuals by using manual counting techniques were used to calculate normal platelet counts and these values are used by standard haematology textbook. It is easier to conduct platelet count studies on a large group of individuals with precision because of automatic counting and data processer tools. This research aims at determining the mean platelet counts in males and females of different age groups and finding out if there is any significant variation between age groups.

Patients commonly undergo complete blood count. Previous researches have shown platelet counts to be significantly higher in women [4]. There is still much to know about variations in platelet counts in healthy adults.

Rationale

BPKIHS is a tertiary care centre located in eastern region of Nepal. In this study we will investigate about changes in platelet counts and mean platelet volume with increasing age. We will investigate difference in platelet counts and platelet volume with respect to gender. Since there have been no research conducted in the past in Platelet counts and Mean Platelet Volume in elderly in BPKIHS, we want to calculate the suitable range and relationship with aging.

According to research conducted in Nigeria there was significant gender dependent variations in platelet count and mean platelet volume. Moreover, platelet count was found to decrease with age. So, we have chosen this topic:

To compare platelet counts and mean platelet volume of healthy controls of age group 20 – 30 years and healthy cases of age group 50 and above

To find suitable reference values of platelet counts and mean platelet volume in elderly males and females

Objectives

Primary objective

1) To compare platelet counts and mean platelet volume of healthy controls of age group 20-30 years and healthy cases of age group 50 and above.

Secondary objectives

1) To find out suitable values of platelet counts and mean platelet volume in elderly males and females.

2) To find out relationship between platelet size and number.

Literature Review

Studies on platelet counts have shown that number of platelets decreases with age so that thrombocytopenia was rare in young people whereas thrombocytosis was common [7].

Blood cell counts in elderly people above 65 years showed blood cell count to be significantly different for males and females except for basophils. Hence, blood cell count should be gender specific [8].

Females have higher platelet counts compare to males (261 vs. 237 × 109/L,P<0.001), and platelet number fell with increasing age, with a decrease from infancy to old age of 35% in males and about 25% females. This falling trend common in all investigated populations. Platelet count in population under 15 years was significantly higher compared to the population above 15 years and below 65 years (299 vs. 252 × 109/L,P<0.001), and platelet count in population of 15-64 years was significantly higher when compared to population over 64 years (252 vs. 233 × 109/L,P<0.001). Under 15 years of age, variation in platelet count of men and women was not significant (298 vs. 299 × 109/L,P=0.690), but women of age range 15-64 years and over 64 years had significant difference (264 vs. 238 × 109/L,P<0.001) and (245 vs. 220 × 109/L,P<0.001) respectively [9].

The mean platelets count of 218.90 × 109/L and 247.8 × 109/L were determined among men and women blood donors respectively. Statistically insignificant rise in platelet count was noted (P=0.01). Similar insignificant difference was noted in case of MPV (P=0.01). This study showed platelet count to be sex specific and gender should be considered while diagnosing thrombocytopenia [10].

Likewise, increased platelet count in females 252.35 +/- 41.25 × 10(9)/l as compared to men 221.87 +/- 37.63 × 10(9)/l (p=0.0002) was noted and statistically insignificant differences were noted in case of MPV by Butkiewicz AM et al. Platelet count is sex variable, being higher in females than males [4].

Materials and Methods

Study Design: Prospective study

Duration of study: 29 March-25 April 2015

Study setting: BPKIHS, Dharan Municipality of Sun sari District,

Study group: Elderly men, women of age group 50 and above years visiting Haematology lab of BPKIHS as cases and healthy males and females of age group 20-30 years as controls.

Sample size: 202

100 cases: 47 Males and 53 Females

102 controls: 29 Males and 73 Females

Sampling frame: patients who visited haematology department of BPKIHS

Inclusion Criteria:

Males and females aged 50 and above years. Similarly, young adults aged 20-30 years were used as control.

Exclusion Criteria:

Males and females not giving verbal consent.

No history of terminal illness like carcinoma, thalassemia, sickle cell disease, tropical diseases like malaria, dengue, no history of blood loss or blood transfusion in last six months

Data collection tools

Data collection will be carried out at Haematology Department of BPKIHS. Face to face interview will be taken to fill the semi-structured questionnaire.

5-part differential haematology analyser

Ethical clearance

Ethical clearance was obtained from Institutional Ethical Review Board of BPKIHS.

Statistical analysis

All interviewed questionnaire was indexed and kept on file. Database was entered in Microsoft Excel 2007 and converted into SPSS 11.5 v for statistical analysis. For descriptive statistics mean and Standard deviation will be calculated along with-it tabular presentation will be made. For inferential statistics, $\chi 2$, z or U test will be applied to find out the significant difference between platelet count in elderly and young at 95% confidence interval where p=0.05.

Research process (thorough and clear description of all data gathering processes that will take place)

The study requires patients' participation in a face to face interview to discuss questions related to research.

They need to show us their OPD card and lab investigation reports.

They have the total will to leave the interview, and it's their choice to voluntarily take part in the interview.

Results

The mean platelet count was 200.36 × 10^9/L with 94.695 S.D.in healthy elderly males and 207.13 × 10^9/L with 68.965 S.D. in females. There was an insignificant decrease (P>0.05) in the mean platelet count in the healthy aged males and females when compared with 190.67 × 109/L with S.D 60.774 × 10^9/L in males and 227.93 × 10^9/L with S.D.66.371 × 10^9/L in female healthy young adult control. Mean platelet count in young adult control was higher but the rise was insignificant (P>0.05) (Tables 1-3).

MPV in the elderly men was 10.31 fl with S.D.1.49 and females was 10.72 fl with S.D. 1.769 fl and and in young controls was 10.93 fl with S.D 1.80 Fl in females and 10.58 fl with S.D 1.86 Fl respectively. The fall in mean platelet volume in the healthy aged population was statistically insignificant (P>0.05) compared to that of the young adult population (Table 3). Inverse correlation between mean platelet count and mean platelet volume (r=0.001) was noted.

Parameters	Males (n=47)	Females (n=53)
Platelet counts	200.36 × 10^9/L	207.13 10^9/L
MPV	10.31 fl	10.72 fl

Table 1: Platelet number and size in elderly.

Parameters	Males (n=27)	Females(n=73)
Platelet counts (X 10^9/l)	190.67	227.93
MPV in Fl	10.58	10.93

Table 2: Platelet number and size in healthy aged males and females.

Sex	Platelet count	MPV	Number
Male	211.43	10.697030	126
Female	198.58	10.451316	76
Parameter	Platelet Count	MPV	Number
Controls	218.76	10.86	102
Cases	203.95	10.53	76

Table 3: Platelet number and size in controls.

Discussion and Conclusion

Results from this study showed that more platelets are found in females and young individuals whereas lesser in elderly and males. Sex specific variation in platelet count was shown amongst the Algerians [11]. Similarly, higher platelet count female In Spanish population, was noted by Lazomo in Nigerian population by Calabar and Zaria [12,13] in separate studies. Butkiewicz [4] observed similar findings with higher count in females.

Decline in platelet count in healthy elderly males and females noted in this study may be due to hookworm infestation which is common in Nepal. Likewise, increased fatty tissue replacement of bone marrow, impaired cytokine production in the aged population, low intake iron, protein, vitamins and folic acid. Malaria, dengue and malignancy ca result in decline in platelet count but only healthy population was taken into account in this study.

Large platelets produced in response to decrease platelet counts were found to be less reactive. [6]. Mean platelet Volume depends on thrombopoietic conditions.

The inverse correlation observed between platelet count and mean platelet volume (r=0.001) in the aged population is similar to previous findings [14].

Similarly, it also agrees with research [15].

But unlike findings [7], the platelet count in male control is less than those of elderly males and platelet count in the age range 20-30 years was insignificantly higher when compared to subjects over 49 years. Women had more platelets in the age range 15–64 years (264 vs. 238 × 109/L,P<0.001) and over 64 years (245 vs. 220 × 109/L,P<0.001) (Ginevra Biino et al, 2013). We found similar increase but the increase was insignificant.

With the advent of technology and awareness, more and more blood counts are being done, it is crucial to avoid sending unnecessary investigations for age and sex related variation in platelet count. Further studies are to be conducted among a large healthy population for accurate reference values for male and female. On the contrary to the study conducted amongst Nigerians [15], this study suggests that there is an insignificant variation in platelet count and mean platelet volume calculated between the healthy aged population and the young adult control (P>0.05). Therefore, separate values for platelet count and mean platelet volume for the elderly is not necessary. Hence, the same reference values 150 × 10^9/l and 6.5 to 12.0 fl. Moreover, the increase in platelet count in females was insignificant on the contrary to findings of [8] but agrees with findings of [10] So, normal ranges for haematological indices need not be sex specific.

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