Original Article

DOI: 10.7860/JCDR/2016/20818.8364

Dermatology Section

Palmoplantar Dermatoses- A Clinical Study of 300 Cases

AMRITA A HONGAL[1], NADIGA RAJASHEKHAR[2], SOMASHEKAR GEJJE[3]

ABSTRACT

Introduction: Dermatoses affecting palms and soles are among the most difficult of all dermatological therapeutic problems. Many previous studies have focused on the specific diseases of palmoplantar dermatoses. However, none of them have included a comprehensive study of palmoplantar dermatoses.

Aims: To study the epidemiological aspects like age distribution, sex distribution, the dermatoses affecting the palms & soles and the frequency of involvement of palms, soles or both palms & soles, in patient with palmoplantar dermatoses.

Materials and Methods: This cross sectional study was conducted in the Department of Dermatology between October 2011 to September 2013. First 300 cases attending the department of dermatology primarily with complaints pertaining to palms and soles were enrolled in the study. After taking consent a detailed history and clinical examination pertaining to the aim of the study was recorded and analysed, which included inspection of morphology and distribution of lesions and palpation of any swelling. Direct microscopic examination of scrapings, wet mounted with 10% potassium hydroxide was done for cases with scaly lesions. Those who had a pustule, gram staining was done. Patch testing using Indian Standard Battery Series was done for those cases of eczema. A sample for biopsy was taken when diagnosis could not be arrived clinically, and subjected to histopathological examination.

Results: In our study of 300 patients with palmoplantar dermatoses, 164 were females and 136 were males, the ratio observed being 1.2:1. The peak incidence was found in the age group 21-30 years, with 41 females (25%) and 35 males (25.7%). Most frequently affected individuals in this study were housewives (30%). The most common five diseases of palmoplantar dermatoses were palmoplantar psoriasis (20.7%), moniliasis (19%), palmoplantar hyperhidrosis (7%), keratolysis exfoliativa (6%) and pitted keratolysis (6%). Majority of patients had involvement of both palms and soles (44.3%) as compared to patients with involvement of only palm (28%) and only sole (27.3%). The commonest palmoplantar dermatoses with only palm involvement was keratolysis exfoliativa (16.7%), with only sole involvement was moniliasis (41%) and with both palms and soles involvement was palmoplantar psoriasis (41.4%). Associated nail changes were seen in 80 cases (26.6%), with maximum incidence in palmoplantar psoriasis (62.5%). Associated dermatological conditions were observed in 43 patients (14.3%).

Conclusion: Palmoplantar dermatoses are frequently encountered in the dermatologic field. Further investigation with a wider and larger population is necessary to understand the epidemiology, based on which accurate diagnosis and proper treatment could be achieved.

Keywords: Epidemiology, Nail changes, Palm, Palmoplantar dermatoses, Sole

INTRODUCTION

Palms and soles have a non-hairy skin which is marked by series of ridges and grooves with a configuration unique to each individual known as dermatoglyphics. In persons whose livelihood depends upon occupation which involves manual work and walking, this group of diseases may be occupationally disabling.

Various dermatoses affect palms and soles, few are specific to palms and soles, not affecting skin elsewhere in the body. Subtle clinical differences exist between them, which needs to be picked up by keen observation. This helps us to arrive at the diagnosis. The most common dermatoses (Callosities, Eczema, Palmoplantar keratoderma, Psoriasis, Hand foot mouth disease, Plantar warts, Hyperhidrosis, Black heel and palm, Piezogenic pedal and Palmar papules, Idiopathic recurrent palmoplantar hidradenitis) are described below, mainly the clinical features and the aetiology which will help us to arrive at the diagnosis.

Callosities are plaques of hyperkeratosis caused by repeated friction and/or pressure [1] and is a normal protective response.

The term 'Eczema of the hand and foot refers to predominant involvement of hands and/or feet in the eczematous process [2]. It is caused by diverse aetiological factors, both exogenous and endogenous. Though any part of hand may be involved in any type of eczema, dermatitis affecting the palms is endogenous, whereas, that on the dorsal aspect is exogenous. The exogenous causes include irritant and allergic contact dermatitis, and endogenous causes include atopic dermatitis, discoid eczema, pompholyx and hyperkeratotic eczema.

Palmoplantar Keratoderma (PPK) comprises a heterogeneous group of disorders of keratinization. They are classified by morphology, and distribution of hyperkeratosis, genetic transmission, and presence of skin lesions on areas other than palms and soles and age of onset [3]. They can be caused by a host of dermatological disorders, genetic or acquired, as the only morbid change, or as a part of more widespread dermatoses, or even as a manifestation of an internal malady [4].

Psoriasis on palms and soles may present as typical scaly patches on which fine silvery scale can be evoked by scratching which are sharply demarcated and stop at the palm-wrist junction and sides of fingers, less well-defined plaques, pustulosis or mixed forms occasionally occur [5].

Many bacterial, fungal and viral organisms can produce primary or secondary infections of palms and soles. Corynebacterial infections affecting palms and soles are erythrasma and pitted keratolysis. Erythrasma commonly presents as asymptomatic scaling, fissuring and maceration involving the webspaces of toes. Pitted keratolysis usually involves the soles and presents as pale,

edematous plantar skin with small punched out pits. Tuberculosis affects palms and soles, presents as granulomatous plaque, warty plaque or persistent ulceration. Dermatophytic infections of palms and soles called Tinea manuum and Tinea pedis respectively, presents as dry hyperkeratotic moccasin type, inflammatory/ vesicular spreading type, or interdigital type. Candidiasis manifests as intertrigo affecting the interdigital spaces. Verruca plantaris are benign papillomas of skin, caused by DNA papilloma virus. Depending on the HPV type, plantar warts are of three varieties [Table/Fig-1] [6].

Sl. No.	Type	Causative HPV Subtype	Description
1	Myrmecia	HPV-1	Usually single, deep, dome-shaped and painful
2	Mosaic warts	HPV-2	Numerous, superficial and confluent plaques of closely grouped warts in a mosaic pattern and often painless.
3	Keratosis punctata like	HPV-4	Small, endophytic, hyperkeratotic warts [7][8]

[Table/Fig-1]: Plantar warts.

In Hand foot mouth disease, the skin lesions are inconsistent, they are small vesicles up to 5mm in diameter, most common on the hands and around the heel but may be seen in the finger flexures and on the palms and soles [9].

Hyperhidrosis of palms and soles is a primary and focal hyperhidrosis. It is generally episodic and is often worse during the day [10]. It may not occur during sleep or sedation, although this is not universal [11]. In one study, sweating was more common during mid-day compared to mornings or evenings [12].

Black heel and palm is pigmentation of the heel (or palm) secondary to extravasation of RBC's due to shear stress rupture of capillaries during violent sport [13].

Piezogenic pedal and palmar papules are soft skin-coloured papules and nodules that appear on side of the heel, usually the medial aspect when subject is standing, and disappears when weight is taken off the foot [14]. Similar papules have also been noticed on lateral edge of the hand and wrist and peizogenic palmar papules have recently been described as a physical sign of suprafascial palmar lipoma [15,16].

Symmetric erythema of the soles is a type of localized erythema frequently seen in sneaker wearing male athletes, and military men of 20-30 years. The skin is erythematous with a well-defined border [17].

Idiopathic recurrent palmoplantar hidradenitis is characterized by tender and painful erythematous plaques and nodules on the soles and less often, palms of young patients in good health [18].

Tumours developing on palms and soles may be benign or malignant. Common benign tumours include cutaneous horn, dermatofibroma, eccrine poroma, epidermal cyst, granuloma pyogenicum and various nevi. Common malignant tumours include malignant melanoma, squamous cell carcinoma and Kaposi's sarcoma.

Many previous studies have focused on the specific diseases of palmoplantar dermatoses; however, none of them have included a comprehensive study of palmoplantar dermatoses. Hence, this study was taken up to investigate the clinical aspects of palmoplantar dermatoses.

The study was conducted to evaulate the epidemiological aspects like age distribution, sex distribution, the dermatoses affecting the palms & soles and the frequency of involvement of palms, soles or both palms & soles in patient with palmoplantar dermatoses randomly selected from those attending OPD.

MATERIALS AND METHODS

This cross sectional study was conducted in the Department of Dermatology between October 2011 to September 2013. First 300 cases attending the department of dermatology primarily with complaints pertaining to palms and soles were enrolled in the study.

Patients with palmoplantar dermatoses were selected and included in the study after taking their consent. Patients who have already been diagnosed and receiving treatment for the same were excluded. Patients with Hansen's disease presenting with lesions on palms and soles were also excluded. Direct examination of scrapings wet mounted with 10% potassium hydroxide was done for cases with scaly lesions. Those who had pustule, a gram staining was done. Patch testing using Indian Standard Battery series was done for those cases of eczema [19], wherever, diagnosis was not arrived, differential diagnosis was considered and a sample for biopsy was taken i.e., an elliptical bit of tissue including adjoining normal skin was excised, and subjected to histopathological examination. Then in the clinic-pathological meeting the diagnosis was made.

The diagnosis of Hereditary PPK was suspected when children and young adults presented with PPK and was confirmed when similar condition was present in parents, grandparents, siblings or other family members. The diagnosis was arrived mainly by analyzing family tree but no genetic tests were applied.

RESULTS

[Table/Fig-2] shows the incidence of palmoplantar dermatosis, commonest being Palmoplantar psoriasis (20.7%).

Among 300 cases in the study, 164(54.7%) were females and rest 136(45.3%) were males [Table/Fig-3].

No	Diagnosis	No. of Cases	Percentage
1	Palmoplantar psoriasis	62	20.7
2	Moniliasis	57	19
3	Palmoplantar hyperhidrosis	21	7
4	Keratolysis exfoliativa	18	6
5	Pitted keratolysis	18	6
6	Contact allergic dermatitis	13	4.3
7	Hereditary PPK	13	4.3
8	Hyperkeratotic palmar eczema	12	4
9	Juvenile plantar dermatoses	11	3.7
10	Pompholyx	11	3.7
11	Trichophytosis	10	3.3
12	Wart	10	3.3
13	Callus	8	2.7
14	Contact irritant dermatitis	8	2.7
15	Erythema multiforme	5	1.7
16	Wear and tear dermatitis	5	1.7
17	Corn	4	1.3
18	Finger tip eczema	3	1
19	Pustular psoriasis	3	1
20	Hand, foot and mouth disease	2	0.7
21	Acropigmentation	1	0.3
22	Frictional blister	1	0.3
23	Leukoderma	1	0.3
24	Melanocytic nevi	1	0.3
25	Palmar xanthoma	1	0.3
26	Ring Eczema	1	0.3
	Total	300	100

[Table/Fig-2]: Incidence of palmoplantar dermatoses.

Sex	No. of cases	Percentage
Females	164	54.7
Males	136	45.3
Total	300	100

[Table/Fig-3]: Sex incidence.

Age (years)	No. of Cases (percentage)		
	Female	Male	Total
<10	11 (6.70)	9 (6.60)	20 (6.70)
11-20	31 (18.90)	23 (16.90)	54 (18.00)
21-30	41 (25.00)	35 (25.70)	76 (25.30)
31-40	34 (20.70)	17 (12.50)	51 (17.00)
41-50	21 (12.80)	20 (14.70)	41 (13.70)
51-60	16 (9.80)	16 (11.80)	32 (10.70)
61-70	8 (4.90)	12 (8.80)	20 (6.70)
>70	2 (1.20)	4 (2.90)	6 (2.00)
Total	164	136	300

[Table/Fig-4]: Age incidence.

Occupation	No. of Cases	Percentage
Housewives	90	30
Students	67	22.3
Agriculturists	52	17.3
Skilled labourers	31	10.3
Unskilled labourers	17	5.7
Elderly	16	5.3
Professionals	15	5
Business persons	9	3
Children	2	0.7
Unemployed	1	0.3
Total	300	100

[Table/Fig-5]: Occupation of patients.

Maximum age incidence was seen in the age group of 21-30 years (25.3%) while a least incidence was in the age group of 70 years and above (2.0%) [Table/Fig-4].

Considering the occupation of the patients, a maximum incidence was noted in housewives (30%) [Table/Fig-5].

Most patients had involvement of both palms and soles (44.3%) as compared to patients with involvement of only palms (28%) and only soles (27.3%). Out of 300 patients studied, only 80 patients (26.6%) had associated nail changes, of them maximum incidence was seen in palmoplantar psoriasis (62.5%) followed by moniliasis (17%), hereditary PPK (6.2%), juvenile plantar dermatosis (2.5%), pustular psoriasis (2.5%), trichophytosis (1.2%), hyperkeratotic palmar eczema (1.2%), contact allergic dermatitis (1.2%) and acropigmentation (1.2%).

DISCUSSION

The most common five diseases in our study were palmoplantar psoriasis (20.7%), moniliasis (19%), palmoplantar hyperhidrosis (7%), keratolysis exfoliativa (6%) and pitted keratolysis (6%). However, in the study by Kang et al., the most common five diseases of palmoplantar dermatoses were palmoplantar pustulosis (23.2%), verruca (11.4%), pompholyx (10.1%), palmoplantar keratoderma (8.9%) and contact dermatitis (8.0%) [20].

In the present study, the pattern of sex distribution of patients showed 54.7% females and 45.3% males with female to male ratio of 1.2:1; while there was male preponderance in study by Kang et al., with F:M = 1:1.01 [20].

In the present study, most of the patients belonged to the age group of 21-30 years (25.30%), while in the study by Kang et al., maximum incidence was seen in two age groups 40-49 years and 50-59 with 18.1% each [20]. In the present study, the mean age was 34.32 years, while in the study by Kang et al., it was 37.5 years [20].

In the present study, among the occupational group, housewives constituted the majority (30%) followed by students (22.3%), agriculturists (17.3%), skilled labourers (10.3%), unskilled labourers (5.7%), elderly retired personnel (5.3%), professional workers (5%), business personnel (3%), children (0.7%) and un-employed (0.3%). This reflects the functional importance of the palms and soles in one's occupation. In addition to the physiological functions of temperature regulation and tactile sensation, palms and soles have wide variety of functions which include grasping, manipulating, precise movements (palms) and locomotion (soles). When dermatosis affects palms and soles, it impairs the activity of individual especially manual labourers.

In our study, palmoplantar dermatoses appeared on the palms only in 28% patients, on the soles only in 27.3% patients, and both palms and soles in 44.3% cases. While in study by Kang et al., palmoplantar dermatoses appeared on the palms only in 20.6% patients, on the soles only in 51.9% patients and on both the palms and soles in 27.4% patients, which could be due to the occupational status [20]. In the present study, the palmoplantar dermatosis with maximum incidence involving only the palms was keratolysis exfoliativa (16.7%), while in the study by Kang et al., it was pompholyx (22.4%) [20]. The palmoplantar dermatosis with maximum incidence involving only the soles was moniliasis (41%), while in the study by Kang et al., it was verruca (17.9%) [20]. The palmoplantar dermatosis with maximum incidence involving both palms and soles was palmoplantar psoriasis (41.4%), while in the study by Kang et al., it was palmoplantar pustulosis (46.2%) [20].

In the present study, out of 300 patients studied only 80 patients (26.6%) had associated nail changes, maximum incidence was seen in palmoplantar psoriasis (62.5%).

Individual description of five common dermatoses

Palmo-plantar Psoriasis: A male preponderance was seen in our study similar to that observed by Khandpur et al., in our study, majority of patients belonged to 51-60 years (21%); in contrast to study by Khandpur et al., where majority of cases were in age group of 21-50 years (66.8%) [21]; this difference may be due to the shorter intervals of age group considered in our study. In our study palmoplantar psoriasis was common in housewives, agriculturists and elderly retired individuals (40 cases i.e. 64.5%) while in study, by Khandpur et al., it was common among farmers, manual labourers and housewives (53 cases i.e. 34.4%) [21]. In our study, 1.6% had only palmar involvement, 9.6% had only sole involvement and 88.7% had involvement of both palms and soles. In study of Khandpur et al., only palmar involvement was seen in 15.6% only plantar in 14.3%, both palmoplantar in 48.7% and palmar and/or plantar involvement with psoriasis elsewhere in 21.4% cases [21]. In study of Kumar et al., plantar involvement was twice more common than palmar involvement (91% Vs. 55%) [22]. They attributed this to the Indian custom of walking barefoot or wearing open slippers. The sites of involvement over palms were typically pressure points i.e., thenar (53.5%) and hypothenar (46.4%) eminences, with center or distal aspect less affected. In the sole, the instep (78.6%) and sides of feet (49.1%) were commonly involved. This pattern was also observed in the study of Khandpur et al., [21]. In our study, nail involvement was observed in 62.5% of palmoplantar psoriasis, while in study by Khandpur et al., 41% patients had nail involvement [21].

Moniliasis and Trichophytosis: The second commonest palmoplantar dermatosis was moniliasis (57 cases i.e., 19%) with only palmar involvement in 19.2%, only plantar involvement in 59.6% and both palms & soles involvement in 21.05%. Majority

of them were housewives (63.1%). Prolonged water contact was the predisposing factor in 92.9% cases. Erosio interdigitalis blastomycetica was seen in 86.6% of cases. In the study of Shroff et al., the commonest presentation of cutaneous candidiasis was intertrigo/erosio interdigitalis blastomycetica (75%) followed by vulvovaginitis (19%) and paronychia (17%) [23]. Only 10 cases of trichophytosis were observed with maximum incidence in 21-30 years age group akin to that of the study by Pankajalakshmi et al., [24]. Of them were 5 cases of tinea manuum, 3 cases of tinea pedis and 2 cases of tinea pedis with tinea manuum.

Palmoplantar Hyperhidrosis: In our study, 21 cases (7%) of palmoplantar hyperhidrosis were observed. Of them, 71.4% belonged to age group of 11-20 years and majority had the disorder for 1-10 years duration, suggesting onset of illness during childhood [10]. Exacerbation with season and stress was seen only in 1 case, which is consistent with findings of Sato et al., [11].

Keratolysis Exfoliativa: In our study, 18 cases (6%) of keratolysis exfoliativa were observed. Highest incidence was seen in the age groups of 11-20 years and 31-40 years accounting for 27.8% each. It was also the commonest palmoplantar dermatoses with only palmar involvement. Associated excessive sweating of palm and soles was seen in 61.1% of patients.

Pitted Keratolysis: In our study, 18 cases (6%) of pitted keratolysis were observed. The commonest age group affected was 21-30 years (7 cases i.e., 38.9%). Excessive sweating over palms and soles in 6 cases and prolonged contact with water in 3 cases were the predisposing factors.

LIMITATION

Study with larger population is necessary to understand the epidemiology of palmoplantar dermatoses. Skin biopsy needs to be done and subjected to histopathological examination with special stains in all cases to support the diagnosis.

CONCLUSION

The study, on palmoplantar dermatoses is a good subject for study as palmoplantar dermatoses have a protean manifestation. The subject is complex, as the term palmoplantar includes heterogenous group of disorders; but no classification exists and the opinions vary regarding the conditions to be included under palmoplantar dermatoses.

Hyperkeratosis is the most common feature seen over palms and soles, which can be a primary lesion when it is called callosity or it can be a secondary lesion to other diseases like eczema, psoriasis and tinea infections. In our study, a female preponderance was seen, which reflects the higher chances of women contracting disease at work and at home. A peak incidence of palmo-plantar dermatoses was observed in 21-30 years age group that can be attributed to more risks/trauma/contact during working or walking (barefooted) in this age group.

This study gives an insight into the subject. It is very important to recognize the symptoms and the clinical features of dermatoses affecting palms and soles, as the clue that clinches the diagnosis lies in the clinical signs.

REFERENCES

[1] Singh D, Bentley G. Callosities, corns and calluses. *Br Med J*. 1996;312:1403-06.
[2] Valia RG. Eczema. In: Valia RG, Valia AR, editors. Indian Association of Dermatologists, Venerologists and Leprologists Textbook of Dermatology. 3rd edition. *Bhalani Publishing House*. 2008; 1: 503-509.
[3] Zemtsov A, Veitschegger M. Keratoderma. *Int J Dermatol.* 1993;32:493-98.
[4] Samanta BC, Banerjee BN. Aetiology of plantar keratoderma. *Indian J Dermatol Venereol Leprol*. 1976;42:116-25.
[5] Judge MR, McLean WHI, Muuro CS. Disorders of keratinization. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th edition. Wiley – Blackwell Publication. 2010;1: 19.93-19.117.
[6] Fablonska S, Orth G. Human Papova viruses. In: Rook A, Maibach H, editors. Recent advances in Dermatology. Edinburgh: Churchill Livingstone. 1983: pp.1-36.
[7] Lyell A. Miles JAR. The myrmecia: A study of inclusion bodies in warts. *Br Med J.* 1951;4712(1):912-15.
[8] Montgomery AH, Montgomey RH. Mosaic type of plantar warts: its characteristics and treatment. *Arch Dermatol*. 1948;57:397.
[9] Sterling JC. Viral infections. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th edition. Wiley – Blackwell Publication. 2010; 2: 33.74.
[10] Rajababu KK. Disorders of sweat glands. In: Valia RG, Valia AR, editors. Indian Association of Dermatologists, Venerologists and Leprologists Textbook of Dermatology. 3rd edition. Bhalani Publishing House. 2008;1:806-812.
[11] Sato K, Kang WH, Saga K. Biology of sweat glands and their disorders. II Disorders of sweat gland function. *J Am Acad Dermatol*. 1989;20:713-26.
[12] Krogstad AL, Mork C, Piechnik SK. Daily pattern of sweating and response to stress and exercise in patients with palmar hyperhidrosis. *Br J Dermatol*. 2006;154:1118-22.
[13] Kennedy CTC, Bard DAR, Cream D. Mechanical and thermal injury. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th edition. Wiley – Blackwell Publication. 2010; 28.1-28.61.
[14] Cohen HJ, Gibbs RC, Minkin W. Painful piezogenic pedal papules. *Arch Dermatol*. 1970;101:112-13.
[15] Kumar B, Dogra S. Metabolic disorders. In: Valia RG, Valia AR, editors. Indian Association of Dermatologists, Venerologists and Leprologists Textbook of Dermatology. 3rd edition. Bhalani Publishing House. 2008;2: p.1301.
[16] Cox NH, Bwome G. Piezogenic palmar papules; a novel physical sign of palmar lipoma. *Br J Dermatol.* 2008;159:757-58.
[17] Hitch JM, Hansen RF. Symmetric erythema of the soles. *Arch Dermatol*. 1838;38:881-92.
[18] Hernandez – Martin A, Pinedo F, Perez-Lescene J. Pustular idiopathic recurrent palmoplantar hidroadenitis: An unusual clinical feature. *J Am Acad Dermatol*. 2002;17:S263-65.
[19] Bajaj AK, Saraswat A, Mukhija G, Rastogi S, Yadav S. Patch testing experience with 1000 patients. *Indian J Dermatol Venereol Leprol*. 2007;73:313-18.
[20] Kang BS, Lee JD, Cho SH. A clinicopathological study of palmoplantar dermatoses. *Korean J Dermatol*. 2006;44(6):714-20.
[21] Khandpur S, Singhal V, Sharma VK. Palmoplantar involvement in psoriasis: A clinical study. *Indian J Dermatol Venereol Leprol*. 2011;77:625.
[22] Kumar B, Saraswat A, Kaur J. Palmoplantar lesions in psoriasis: A study of 3065 patients. *Acta Derm Venereol.* 2002;82:192-95.
[23] Shroff PS, Parikh DA, Fernandez RJ, Wagle UD. Clinical & mycological spectrum of cutaneous candidiasis in Bombay. *Journal of Post Graduate Medicine*. 1990;36:83-86.
[24] Pankajalakshmi VV, Saichand T. Incidence of tinea pedis among the local population in Madras. *Indian J Dermatol Venereol Leprol*. 1980;46:209-15.

PARTICULARS OF CONTRIBUTORS:
1. Consultant Dermatologist, The Bangalore Hospital, Bengaluru, Karnataka, India.
2. Professor, Department of Dermatology, J.J.M. Medical College, Davangere, Karnataka, India.
3. Plastic Surgeon, The Bangalore Hospital, Bengaluru, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Amrita A Hongal,
Consultant Dermatologist, The Bangalore Hospital, #202, R V Road, Bengaluru 560004, Karnataka, India.
E-mail: amritahongalleo@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Apr 19, 2016**
Date of Peer Review: **May 02, 2016**
Date of Acceptance: **Jul 07, 2016**
Date of Publishing: **Aug 01, 2016**